



FCC TEST REPORT (WLAN)

REPORT NO.: RF130902E05A-3

MODEL NO.: xAPT-103PUW, FD410

FCC ID: MQT-XAPT103PUW

RECEIVED: Sep. 05, 2013

TESTED: Sep. 05 to Oct. 10, 2013

ISSUED: Oct. 25, 2013

APPLICANT: XAC AUTOMATION CORP.

ADDRESS: 4F, No. 30, INDUSTRY E. RD. IX,
SCIENCE-BASED INDUSTRIAL
PARK,HSINCHU,TAIWAN

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130902E05A-3	Original release	Oct. 25, 2013

1. CERTIFICATION

PRODUCT: Terminal
BRAND NAME: XAC, First Data
MODEL NO.: xAPT-103PUW, FD410
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: XAC AUTOMATION CORP.
TESTED: Sep. 05 to Oct. 10, 2013
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (Model: xAPT-103PUW) 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 :  , **DATE:** Oct. 25, 2013
(Claire Kuan, Specialist)

APPROVED BY :  , **DATE:** Oct. 25, 2013
(May Chen, Manager)



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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 -7.47dB at 0.16172MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.6dB at 2390.00MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted 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	2.98 dB
Radiated emissions (30MHz-1GHz)	5.63 dB
Radiated emissions (1GHz -6GHz)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Terminal
MODEL NO.	xAPT-103PUW, FD410
POWER SUPPLY	DC 7.4V from Battery DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 150Mbps
OPERATING FREQUENCY	2.412 ~ 2.462GHz
NUMBER OF CHANNEL	11
MAXIMUM OUTPUT POWER	802.11b: 75.683mW 802.11g: 117.761mW 802.11n (HT20): 115.878mW 802.11n (HT40): 117.761mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is a WLAN, RFID, GSM and WCDMA device.
2. The EUT has two model names which are identical to each other in all aspects except for the followings:

Brand Name	Model Name	Description
XAC	xAPT-103PUW	for marketing purposes
First Data	FD410	

From the above models, model: **xAPT-103PUW** was selected as representative model for the test and its data was recorded in this report.

3. The antennas provided to the EUT, please refer to the following table:

GPRS, EDGE, WCDMA, HSDPA and HSUPA Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
Ethertronics Inc.	T-000084-01	FPCB	NA	0.14	850
				2.57	1900
WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
ACX	AT3216-T2R4PAA	Chip	NA	1.5	2400-2500
RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	PCB (2 Layer)	NA	13	13.56

4. The EUT incorporates a SISO function.

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

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.
6. The EUT inside has one 2G/3G module which FCC ID: QIPEHS5-US.
7. WLAN, RFID, GSM and WCDMA technology cannot transmit at same time.
8. 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 ≥ 1G	APCM	OB	
-	√	√	√	√	√	-

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

NOTE: 1. "-" means no effect.

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)
802.11g	1 to 11	11	OFDM	BPSK	6

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	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	11	OFDM	BPSK	6

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



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	27deg. C, 54%RH	120Vac, 60Hz	Sean Huang
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Tim Ho
RE≥1G	21deg. C, 70%RH	120Vac, 60Hz	Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

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 v03r01

ANSI C63.10-2009

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

3.4 DUTY CYCLE OF TEST SIGNAL

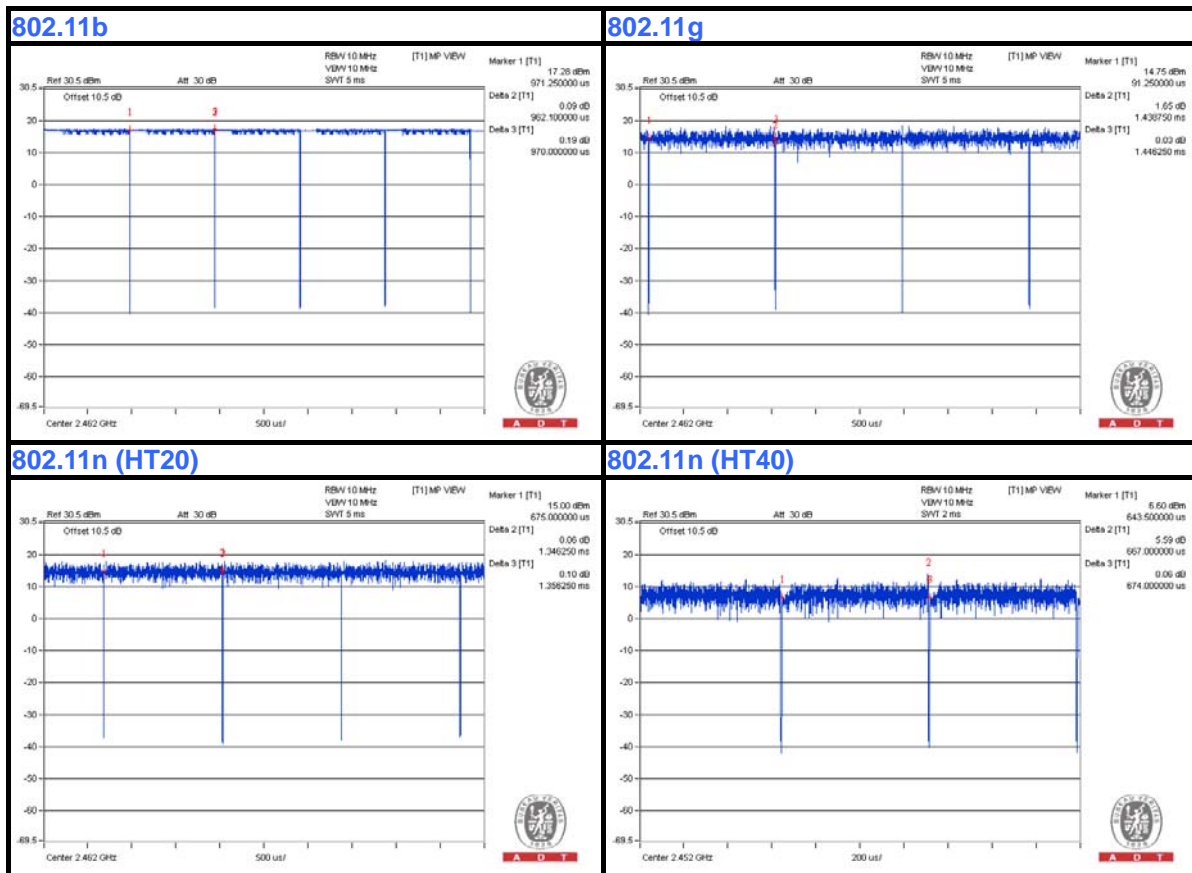
Duty cycle of test signal is > 98 %, duty factor is not required.

802.11b: Duty cycle = 0.962 ms/0.97 ms = 0.992

802.11g: Duty cycle = 1.439 ms/1.446 ms = 0.995

802.11n (HT20): Duty cycle = 1.346 ms/1.356 ms = 0.993

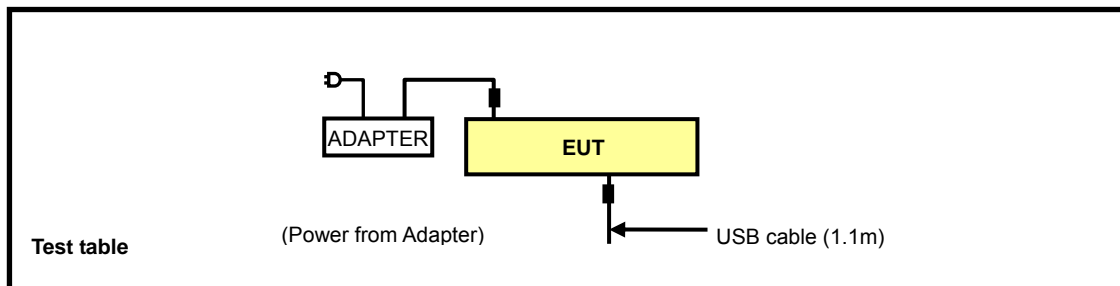
802.11n (HT40): Duty cycle = 0.667 ms/0.674 ms = 0.99



3.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

3.6 CONFIGURATION OF SYSTEM UNDER TEST





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4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
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	100287	Feb. 28, 2013	Feb. 27, 2014
Line-Impedance Stabilization Network (for EUT) ROHDE & SCHWARZ	ENV216	100071	Nov. 09, 2012	Nov. 08, 2013
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	8487731004	Oct. 29, 2012	Oct. 28, 2013
RF Cable (JYEBAO)	5DFB	COACAB-001	May 27, 2013	May 26, 2014
50 ohms Terminator	50	3	Oct. 23, 2012	Oct. 22, 2013
50 ohms Terminator	N/A	EMC-04	Oct. 16, 2012	Oct. 15, 2013
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. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Sep. 05, 2013

4.1.3 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.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

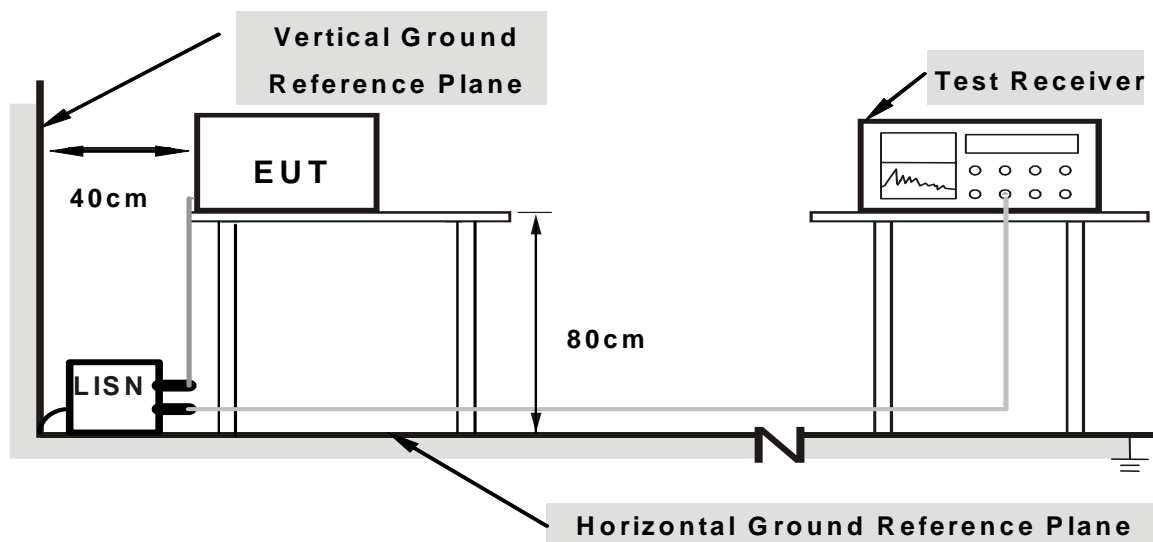
NOTE:

1. 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. Turn on the power of EUT.
2. The communication partner run test program “QA RT3x7x V1.5.6.1” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

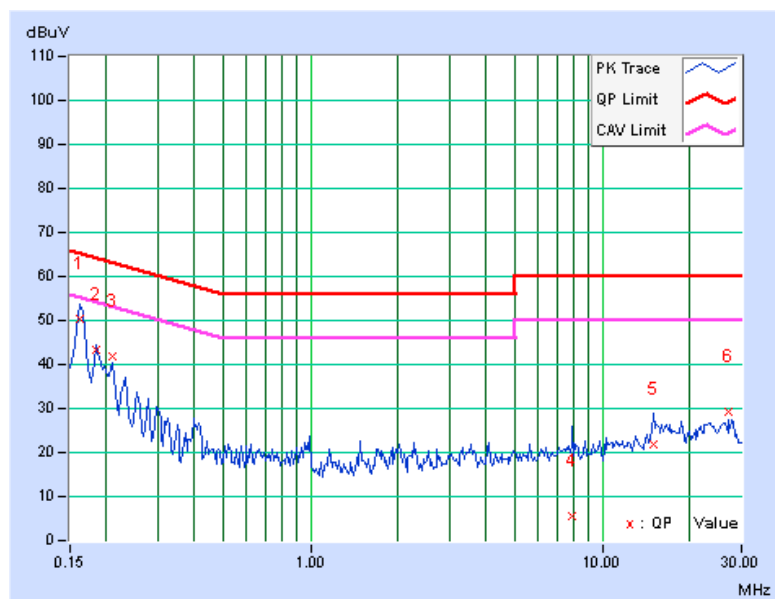
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.16172	9.75	40.79	38.15	50.54	47.90	65.38
2	0.18516	9.76	33.57	18.96	43.33	28.72	64.25	54.25	-20.92	-25.53
3	0.20859	9.76	32.01	14.85	41.77	24.61	63.26	53.26	-21.49	-28.65
4	7.89063	9.98	-4.37	-8.40	5.61	1.58	60.00	50.00	-54.39	-48.42
5	15.02734	10.10	11.71	4.05	21.81	14.15	60.00	50.00	-38.19	-35.85
6	27.11719	10.17	19.15	18.55	29.32	28.72	60.00	50.00	-30.68	-21.28

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

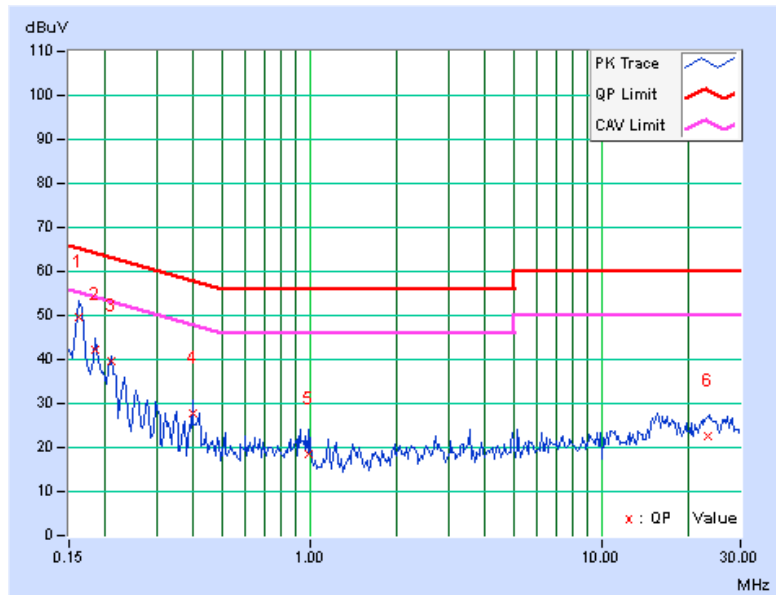


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16197	9.75	40.00	37.57	49.75	47.32	65.36	55.36	-15.61	-8.04
2	0.18516	9.75	32.41	17.68	42.16	27.43	64.25	54.25	-22.09	-26.82
3	0.20859	9.75	29.90	13.47	39.65	23.22	63.26	53.26	-23.61	-30.04
4	0.39609	9.80	17.96	8.08	27.76	17.88	57.93	47.93	-30.18	-30.06
5	0.99766	9.82	8.74	2.57	18.56	12.39	56.00	46.00	-37.44	-33.61
6	23.07813	10.32	12.30	6.93	22.62	17.25	60.00	50.00	-37.38	-32.75

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.



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4.2.2 TEST INSTRUMENTS

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29,2013	Jan. 28,2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Horn_Antenna AISl	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
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. 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. 11, 2013



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For above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Horn_Antenna AISL	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
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. 05, 2013

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:

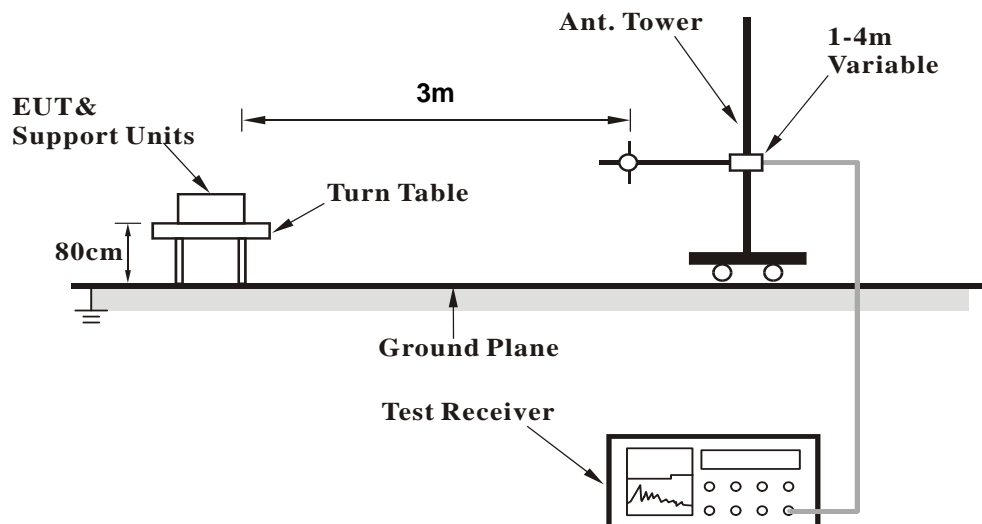
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1/T (Duty cycle < 98%) or 10Hz (Duty cycle > 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

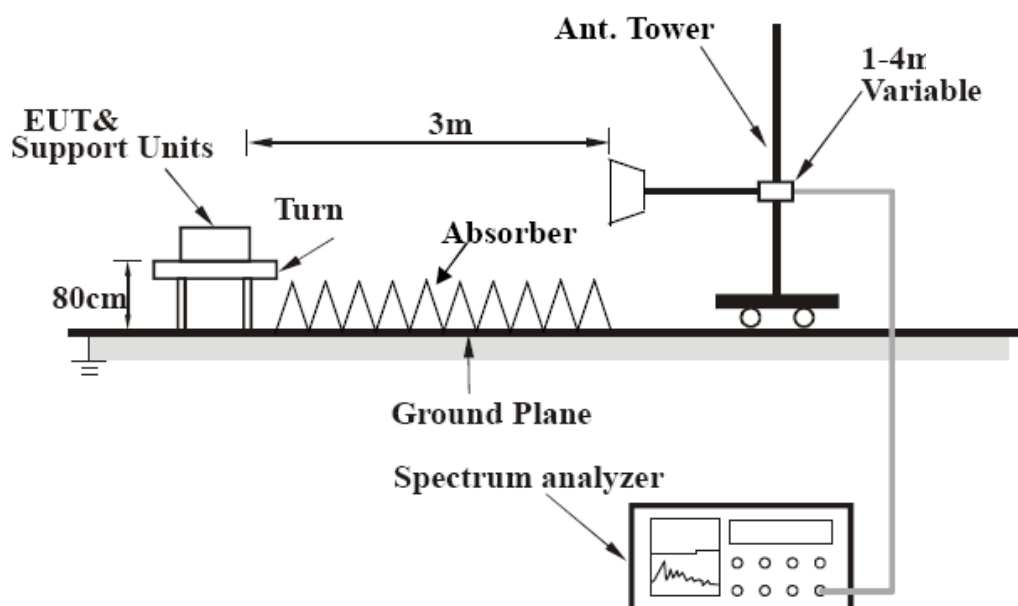
No deviation

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

802.11g

CHANNEL	TX Channel 11	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	42.31	34.4 QP	40.0	-5.6	1.50 H	216	48.26	-13.82
2	46.11	35.3 QP	40.0	-4.8	2.00 H	78	48.41	-13.16
3	162.89	35.2 QP	43.5	-8.3	2.00 H	96	48.62	-13.44
4	222.16	39.6 QP	46.0	-6.4	2.00 H	302	55.87	-16.28
5	251.75	40.3 QP	46.0	-5.7	2.00 H	360	54.75	-14.48
6	333.21	39.4 QP	46.0	-6.7	1.50 H	56	51.08	-11.73
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	35.69	34.6 QP	40.0	-5.4	1.00 V	100	48.32	-13.74
2	48.48	33.0 QP	40.0	-7.0	2.00 V	199	46.63	-13.65
3	202.39	36.9 QP	43.5	-6.6	1.50 V	236	53.48	-16.59
4	217.31	38.7 QP	46.0	-7.3	1.50 V	218	55.25	-16.51
5	251.82	40.0 QP	46.0	-6.0	2.00 V	360	54.46	-14.48
6	261.73	39.4 QP	46.0	-6.6	2.00 V	5	53.50	-14.12

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	2386.00	52.2 PK	74.0	-21.8	1.54 H	163	20.03	32.17
2	2386.00	40.8 AV	54.0	-13.2	1.54 H	163	8.63	32.17
3	*2412.00	104.2 PK			1.56 H	186	71.95	32.25
4	*2412.00	101.5 AV			1.56 H	186	69.25	32.25
5	4824.00	52.0 PK	74.0	-22.0	1.08 H	17	10.43	41.57
6	4824.00	40.3 AV	54.0	-13.7	1.08 H	17	-1.27	41.57

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	2386.00	50.5 PK	74.0	-23.5	1.05 V	262	18.33	32.17
2	2386.00	38.7 AV	54.0	-15.3	1.05 V	262	6.53	32.17
3	*2412.00	100.4 PK			1.05 V	262	68.15	32.25
4	*2412.00	98.1 AV			1.05 V	262	65.85	32.25
5	4824.00	52.6 PK	74.0	-21.4	1.04 V	360	11.03	41.57
6	4824.00	42.2 AV	54.0	-11.8	1.04 V	360	0.63	41.57

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	*2437.00	104.0 PK			1.56 H	190	71.69	32.31
2	*2437.00	101.0 AV			1.56 H	190	68.69	32.31
3	4874.00	49.3 PK	74.0	-24.7	1.00 H	120	7.64	41.66
4	4874.00	37.9 AV	54.0	-16.1	1.00 H	120	-3.76	41.66
5	7311.00	54.0 PK	74.0	-20.0	1.00 H	224	7.86	46.14
6	7311.00	42.7 AV	54.0	-11.3	1.00 H	224	-3.44	46.14

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	101.0 PK			1.53 V	117	68.69	32.31
2	*2437.00	98.1 AV			1.53 V	117	65.79	32.31
3	4874.00	53.2 PK	74.0	-20.8	1.01 V	160	11.54	41.66
4	4874.00	47.3 AV	54.0	-6.7	1.01 V	160	5.64	41.66
5	7311.00	54.1 PK	74.0	-19.9	1.00 V	158	7.96	46.14
6	7311.00	43.0 AV	54.0	-11.0	1.00 V	158	-3.14	46.14

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	104.0 PK			1.51 H	191	71.63	32.37
2	*2462.00	101.1 AV			1.51 H	191	68.73	32.37
3	2483.50	50.6 PK	74.0	-23.4	1.51 H	191	18.17	32.43
4	2483.50	40.3 AV	54.0	-13.7	1.51 H	191	7.87	32.43
5	4924.00	51.7 PK	74.0	-22.3	1.77 H	244	10.00	41.70
6	4924.00	41.3 AV	54.0	-12.7	1.77 H	244	-0.40	41.70
7	7386.00	53.7 PK	74.0	-20.3	1.03 H	218	7.37	46.33
8	7386.00	42.6 AV	54.0	-11.4	1.03 H	218	-3.73	46.33

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	102.1 PK			1.08 V	274	69.73	32.37
2	*2462.00	99.4 AV			1.08 V	274	67.03	32.37
3	4924.00	53.5 PK	74.0	-20.5	1.04 V	164	11.80	41.70
4	4924.00	47.5 AV	54.0	-6.5	1.04 V	164	5.80	41.70
5	7386.00	54.3 PK	74.0	-19.7	1.00 V	171	7.97	46.33
6	7386.00	43.5 AV	54.0	-10.5	1.00 V	171	-2.83	46.33

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	2390.00	61.8 PK	74.0	-12.2	1.57 H	196	29.61	32.19
2	2390.00	44.4 AV	54.0	-9.6	1.57 H	196	12.21	32.19
3	*2412.00	104.2 PK			1.57 H	196	71.95	32.25
4	*2412.00	93.7 AV			1.57 H	196	61.45	32.25
5	4824.00	51.0 PK	74.0	-23.0	1.75 H	245	9.43	41.57
6	4824.00	40.8 AV	54.0	-13.2	1.75 H	245	-0.77	41.57

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	1.10 V	1	27.61	32.19
2	2390.00	40.0 AV	54.0	-14.0	1.10 V	1	7.81	32.19
3	*2412.00	100.2 PK			1.10 V	1	67.95	32.25
4	*2412.00	89.4 AV			1.10 V	1	57.15	32.25
5	4824.00	53.4 PK	74.0	-20.6	1.02 V	162	11.83	41.57
6	4824.00	47.5 AV	54.0	-6.5	1.02 V	162	5.93	41.57

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	2384.80	57.3 PK	74.0	-16.7	1.00 H	83	25.13	32.17
2	2384.80	47.4 AV	54.0	-6.6	1.00 H	83	15.23	32.17
3	*2437.00	106.8 PK			1.00 H	220	74.49	32.31
4	*2437.00	96.4 AV			1.00 H	220	64.09	32.31
5	2489.29	55.8 PK	74.0	-18.2	1.48 H	274	23.36	32.44
6	2489.29	45.3 AV	54.0	-8.7	1.48 H	274	12.86	32.44
7	4874.00	49.4 PK	74.0	-24.6	1.00 H	120	7.74	41.66
8	4874.00	37.3 AV	54.0	-16.7	1.00 H	120	-4.36	41.66
9	7311.00	55.0 PK	74.0	-19.0	1.00 H	116	8.86	46.14
10	7311.00	42.5 AV	54.0	-11.5	1.00 H	116	-3.64	46.14

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	2384.00	49.3 PK	74.0	-24.7	1.00 V	1	17.13	32.17
2	2384.00	39.4 AV	54.0	-14.6	1.00 V	1	7.23	32.17
3	*2437.00	99.5 PK			1.00 V	1	67.19	32.31
4	*2437.00	89.1 AV			1.00 V	1	56.79	32.31
5	2489.00	59.9 PK	74.0	-14.1	1.00 V	1	27.46	32.44
6	2489.00	38.5 AV	54.0	-15.5	1.00 V	1	6.06	32.44
7	4874.00	49.6 PK	74.0	-24.4	1.00 V	220	7.94	41.66
8	4874.00	37.6 AV	54.0	-16.4	1.00 V	220	-4.06	41.66
9	7311.00	54.9 PK	74.0	-19.1	1.00 V	202	8.76	46.14
10	7311.00	42.5 AV	54.0	-11.5	1.00 V	202	-3.64	46.14

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	105.8 PK			1.00 H	218	73.43	32.37
2	*2462.00	95.3 AV			1.00 H	218	62.93	32.37
3	2483.50	62.7 PK	74.0	-11.3	1.00 H	218	30.27	32.43
4	2483.50	46.0 AV	54.0	-8.0	1.00 H	218	13.57	32.43
5	4924.00	48.8 PK	74.0	-25.2	1.00 H	115	7.10	41.70
6	4924.00	36.9 AV	54.0	-17.1	1.00 H	115	-4.80	41.70
7	7386.00	54.7 PK	74.0	-19.3	1.03 H	120	8.37	46.33
8	7386.00	42.3 AV	54.0	-11.7	1.03 H	120	-4.03	46.33

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	100.0 PK			1.00 V	2	67.63	32.37
2	*2462.00	89.3 AV			1.00 V	2	56.93	32.37
3	2483.50	57.2 PK	74.0	-16.8	1.00 V	2	24.77	32.43
4	2483.50	40.4 AV	54.0	-13.6	1.00 V	2	7.97	32.43
5	4924.00	49.4 PK	74.0	-24.6	1.03 V	213	7.70	41.70
6	4924.00	37.4 AV	54.0	-16.6	1.03 V	213	-4.30	41.70
7	7386.00	55.1 PK	74.0	-18.9	1.00 V	199	8.77	46.33
8	7386.00	42.7 AV	54.0	-11.3	1.00 V	199	-3.63	46.33

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	69.3 PK	74.0	-4.7	1.00 H	222	37.11	32.19
2	2390.00	50.6 AV	54.0	-3.4	1.00 H	222	18.41	32.19
3	*2412.00	106.2 PK			1.00 H	222	73.95	32.25
4	*2412.00	96.2 AV			1.00 H	222	63.95	32.25
5	4824.00	48.7 PK	74.0	-25.3	1.00 H	104	7.13	41.57
6	4824.00	36.7 AV	54.0	-17.3	1.00 H	104	-4.87	41.57

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	61.3 PK	74.0	-12.7	1.00 V	359	29.11	32.19
2	2390.00	43.8 AV	54.0	-10.2	1.00 V	359	11.61	32.19
3	*2412.00	98.4 PK			1.00 V	359	66.15	32.25
4	*2412.00	88.6 AV			1.00 V	359	56.35	32.25
5	4824.00	49.9 PK	74.0	-24.1	1.00 V	241	8.33	41.57
6	4824.00	38.2 AV	54.0	-15.8	1.00 V	241	-3.37	41.57

REMARKS:

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



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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	2385.36	61.2 PK	74.0	-12.8	1.00 H	85	29.03	32.17
2	2385.36	49.6 AV	54.0	-4.4	1.00 H	85	17.43	32.17
3	*2437.00	105.4 PK			1.00 H	221	73.09	32.31
4	*2437.00	95.8 AV			1.00 H	221	63.49	32.31
5	2488.76	61.7 PK	74.0	-12.3	1.45 H	273	29.26	32.44
6	2488.76	49.0 AV	54.0	-5.0	1.45 H	273	16.56	32.44
7	4874.00	48.5 PK	74.0	-25.5	1.00 H	117	6.84	41.66
8	4874.00	36.5 AV	54.0	-17.5	1.00 H	117	-5.16	41.66
9	7311.00	55.2 PK	74.0	-18.8	1.00 H	131	9.06	46.14
10	7311.00	42.6 AV	54.0	-11.4	1.00 H	131	-3.54	46.14

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	2385.00	49.0 PK	74.0	-25.0	1.15 V	61	16.83	32.17
2	2385.00	39.2 AV	54.0	-14.8	1.15 V	61	7.03	32.17
3	*2437.00	98.5 PK			1.15 V	360	66.19	32.31
4	*2437.00	88.6 AV			1.15 V	360	56.29	32.31
5	2488.00	55.5 PK	74.0	-18.5	1.15 V	360	23.06	32.44
6	2488.00	40.0 AV	54.0	-14.0	1.15 V	360	7.56	32.44
7	4874.00	49.9 PK	74.0	-24.1	1.04 V	234	8.24	41.66
8	4874.00	38.0 AV	54.0	-16.0	1.04 V	234	-3.66	41.66
9	7311.00	55.2 PK	74.0	-18.8	1.03 V	205	9.06	46.14
10	7311.00	42.7 AV	54.0	-11.3	1.03 V	205	-3.44	46.14

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	108.1 PK			1.00 H	219	75.73	32.37
2	*2462.00	95.0 AV			1.00 H	219	62.63	32.37
3	2483.50	68.6 PK	74.0	-5.4	1.00 H	219	36.17	32.43
4	2483.50	48.3 AV	54.0	-5.7	1.00 H	219	15.87	32.43
5	4924.00	48.8 PK	74.0	-25.2	1.01 H	117	7.10	41.70
6	4924.00	36.8 AV	54.0	-17.2	1.01 H	117	-4.90	41.70
7	7386.00	54.9 PK	74.0	-19.1	1.05 H	116	8.57	46.33
8	7386.00	42.1 AV	54.0	-11.9	1.05 H	116	-4.23	46.33

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.9 PK			1.00 V	360	66.53	32.37
2	*2462.00	88.9 AV			1.00 V	360	56.53	32.37
3	2483.50	60.5 PK	74.0	-13.5	1.00 V	360	28.07	32.43
4	2483.50	42.2 AV	54.0	-11.8	1.00 V	360	9.77	32.43
5	4924.00	49.9 PK	74.0	-24.1	1.00 V	249	8.20	41.70
6	4924.00	37.9 AV	54.0	-16.1	1.00 V	249	-3.80	41.70
7	7386.00	55.7 PK	74.0	-18.3	1.06 V	199	9.37	46.33
8	7386.00	43.1 AV	54.0	-10.9	1.06 V	199	-3.23	46.33

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	71.3 PK	74.0	-2.7	1.00 H	224	39.11	32.19
2	2390.00	53.4 AV	54.0	-0.6	1.00 H	224	21.21	32.19
3	*2422.00	102.1 PK			1.00 H	224	69.83	32.27
4	*2422.00	92.2 AV			1.00 H	224	59.93	32.27
5	4844.00	49.0 PK	74.0	-25.0	1.00 H	126	7.39	41.61
6	4844.00	37.2 AV	54.0	-16.8	1.00 H	126	-4.41	41.61
7	7266.00	54.8 PK	74.0	-19.2	1.03 H	113	8.78	46.02
8	7266.00	42.1 AV	54.0	-11.9	1.03 H	113	-3.92	46.02

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	64.7 PK	74.0	-9.3	1.20 V	360	32.51	32.19
2	2390.00	46.3 AV	54.0	-7.7	1.20 V	360	14.11	32.19
3	*2422.00	95.3 PK			1.20 V	360	63.03	32.27
4	*2422.00	85.0 AV			1.20 V	360	52.73	32.27
5	4844.00	50.1 PK	74.0	-23.9	1.02 V	237	8.49	41.61
6	4844.00	38.1 AV	54.0	-15.9	1.02 V	237	-3.51	41.61
7	7266.00	55.0 PK	74.0	-19.0	1.11 V	211	8.98	46.02
8	7266.00	42.4 AV	54.0	-11.6	1.11 V	211	-3.62	46.02

REMARKS:

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



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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	62.9 PK	74.0	-11.1	1.00 H	220	30.71	32.19
2	2390.00	45.3 AV	54.0	-8.7	1.00 H	220	13.11	32.19
3	*2437.00	102.8 PK			1.00 H	221	70.49	32.31
4	*2437.00	93.8 AV			1.00 H	221	61.49	32.31
5	2483.50	62.6 PK	74.0	-11.4	1.00 H	220	30.17	32.43
6	2483.50	44.8 AV	54.0	-9.2	1.00 H	220	12.37	32.43
7	4874.00	49.5 PK	74.0	-24.5	1.00 H	124	7.84	41.66
8	4874.00	37.4 AV	54.0	-16.6	1.00 H	124	-4.26	41.66
9	7311.00	54.5 PK	74.0	-19.5	1.00 H	109	8.36	46.14
10	7311.00	41.9 AV	54.0	-12.1	1.00 H	109	-4.24	46.14

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.8 PK	74.0	-18.2	1.50 V	358	23.61	32.19
2	2390.00	39.1 AV	54.0	-14.9	1.50 V	358	6.91	32.19
3	*2437.00	95.4 PK			1.50 V	358	63.09	32.31
4	*2437.00	85.5 AV			1.50 V	358	53.19	32.31
5	2483.50	53.1 PK	74.0	-20.9	1.50 V	358	20.67	32.43
6	2483.50	37.8 AV	54.0	-16.2	1.50 V	358	5.37	32.43
7	4874.00	49.6 PK	74.0	-24.4	1.01 V	233	7.94	41.66
8	4874.00	37.6 AV	54.0	-16.4	1.01 V	233	-4.06	41.66
9	7311.00	54.9 PK	74.0	-19.1	1.06 V	214	8.76	46.14
10	7311.00	42.4 AV	54.0	-11.6	1.06 V	214	-3.74	46.14

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	101.4 PK			1.00 H	220	69.05	32.35
2	*2452.00	91.5 AV			1.00 H	220	59.15	32.35
3	2483.50	70.1 PK	74.0	-3.9	1.00 H	220	37.67	32.43
4	2483.50	53.2 AV	54.0	-0.8	1.00 H	220	20.77	32.43
5	4904.00	49.5 PK	74.0	-24.5	1.02 H	112	7.79	41.71
6	4904.00	37.5 AV	54.0	-16.5	1.02 H	112	-4.21	41.71
7	7356.00	55.2 PK	74.0	-18.8	1.00 H	114	8.95	46.25
8	7356.00	42.3 AV	54.0	-11.7	1.00 H	114	-3.95	46.25

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	94.1 PK			1.22 V	2	61.75	32.35
2	*2452.00	84.8 AV			1.22 V	2	52.45	32.35
3	2483.50	63.8 PK	74.0	-10.2	1.22 V	2	31.37	32.43
4	2483.50	46.3 AV	54.0	-7.7	1.22 V	2	13.87	32.43
5	4904.00	49.5 PK	74.0	-24.5	1.00 V	236	7.79	41.71
6	4904.00	37.6 AV	54.0	-16.4	1.00 V	236	-4.11	41.71
7	7356.00	54.6 PK	74.0	-19.4	1.03 V	221	8.35	46.25
8	7356.00	42.1 AV	54.0	-11.9	1.03 V	221	-4.15	46.25

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
R&S SPECTRUM ANALYZER	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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. 10, 2013

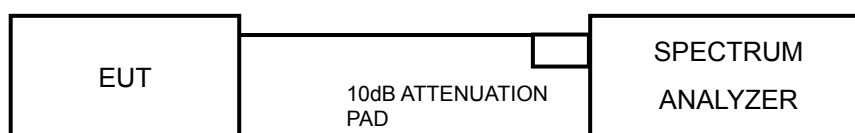
4.3.3 TEST PROCEDURE

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.



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4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.02	0.5	PASS
6	2437	9.76	0.5	PASS
11	2462	10.18	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.37	0.5	PASS
6	2437	16.08	0.5	PASS
11	2462	16.16	0.5	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.05	0.5	PASS
6	2437	17.06	0.5	PASS
11	2462	17.07	0.5	PASS

802.11n (HT40)

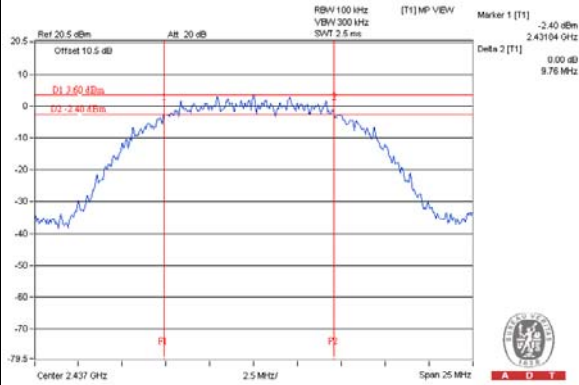
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	35.33	0.5	PASS
6	2437	35.33	0.5	PASS
9	2452	35.31	0.5	PASS



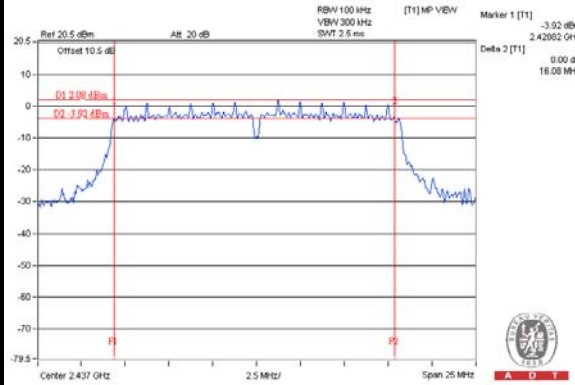
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SPECTRUM PLOT OF WORST VALUE

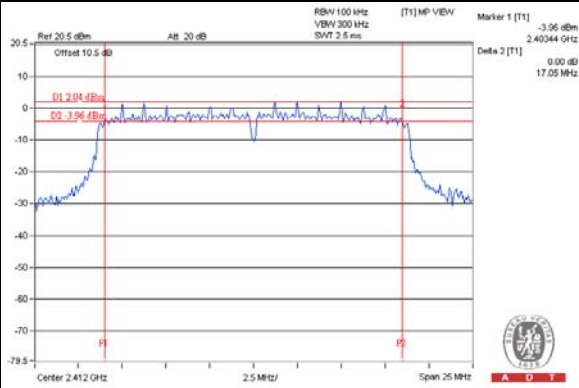
802.11b / CH6



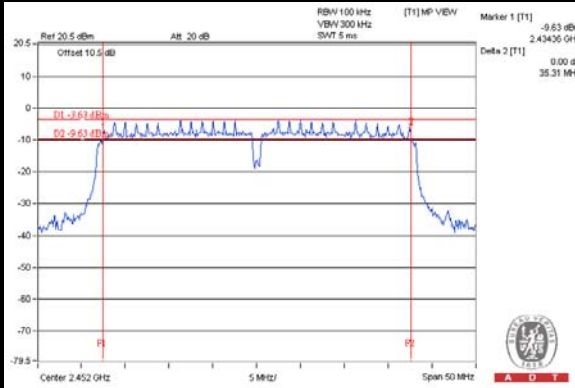
802.11g / CH6



802.11n (HT20) / CH1



802.11n (HT40) / CH9



4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF MAXIMUM PEAK 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	ML2495A	1014008	Apr. 23, 2013	Apr. 22, 2014
Power Sensor	MA2411B	0917122	Apr. 23, 2013	Apr. 22, 2014

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 10, 2013

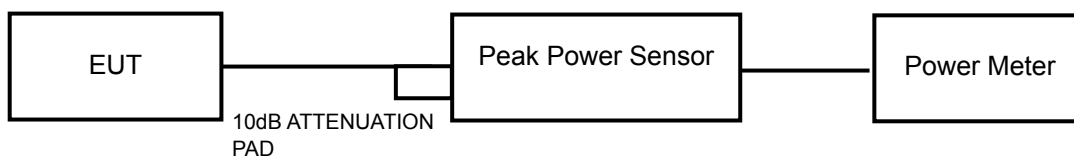
4.4.3 TEST PROCEDURES

The 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6



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4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	70.795	18.50	30	PASS
6	2437	72.277	18.59	30	PASS
11	2462	75.683	18.79	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	100.000	20.00	30	PASS
6	2437	113.763	20.56	30	PASS
11	2462	117.761	20.71	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	99.312	19.97	30	PASS
6	2437	115.878	20.64	30	PASS
11	2462	114.815	20.60	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	105.925	20.25	30	PASS
6	2437	115.080	20.61	30	PASS
9	2452	117.761	20.71	30	PASS

4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	1014008	Apr. 23, 2013	Apr. 22, 2014
Power Sensor	MA2411B	0917122	Apr. 23, 2013	Apr. 22, 2014

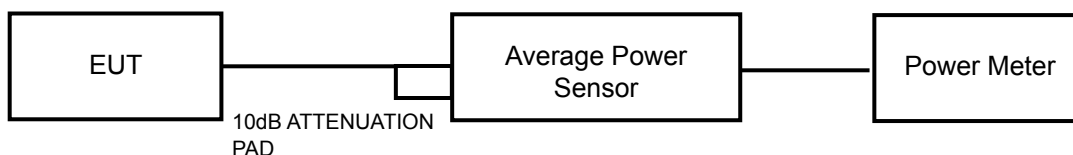
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 10, 2013

4.5.3 TEST PROCEDURES

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.5.6 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	44.668	16.50
6	2437	44.157	16.45
11	2462	45.709	16.60

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	28.445	14.54
6	2437	30.130	14.79
11	2462	31.623	15.00

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	28.314	14.52
6	2437	30.339	14.82
11	2462	30.903	14.90

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
3	2422	22.961	13.61
6	2437	30.974	14.91
9	2452	25.119	14.00

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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. 10, 2013

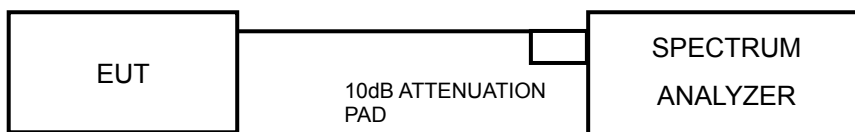
4.6.3 TEST PROCEDURE

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6



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4.6.7 TEST RESULTS

802.11b

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-10.72	8	PASS
6	2437	-11.23	8	PASS
11	2462	-8.34	8	PASS

802.11g

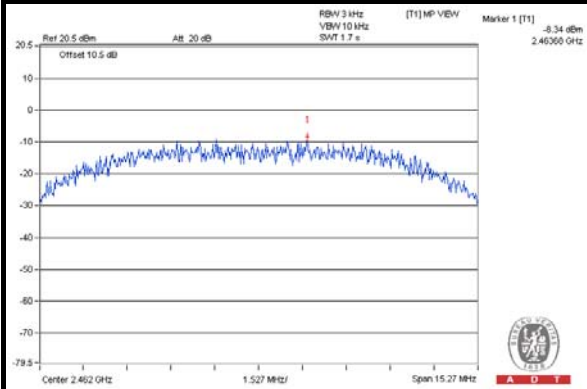
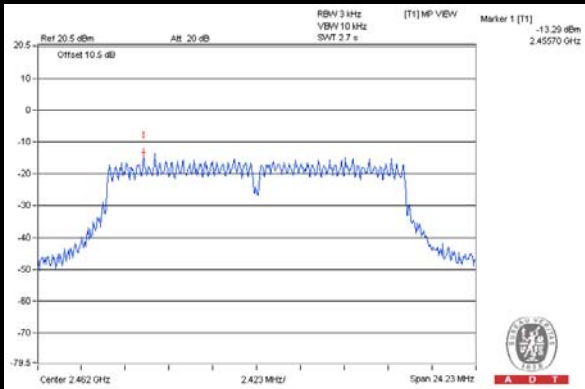
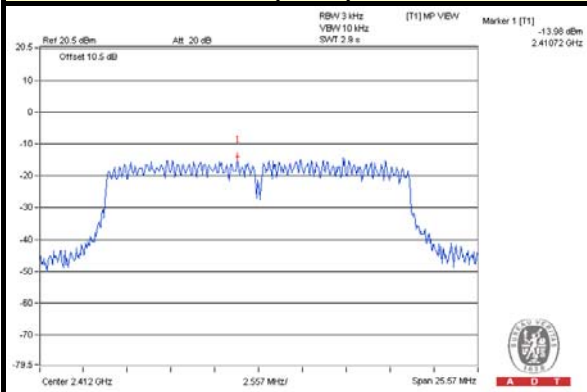
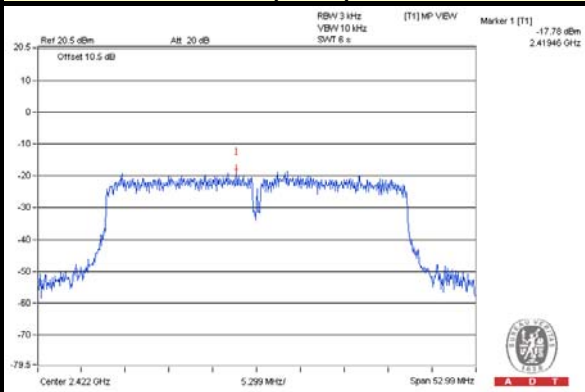
Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-15.09	8	PASS
6	2437	-14.85	8	PASS
11	2462	-13.29	8	PASS

802.11n (HT20)

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-13.98	8	PASS
6	2437	-14.34	8	PASS
11	2462	-14.26	8	PASS

802.11n (HT40)

Channel	FREQUENCY (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
3	2422	-17.78	8	PASS
6	2437	-18.04	8	PASS
9	2452	-19.46	8	PASS

SPECTRUM PLOT OF WORST VALUE
802.11b / CH11

802.11g / CH11

802.11n (HT20) / CH1

802.11n (HT40) / CH3


4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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. 10, 2013

4.7.3 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.

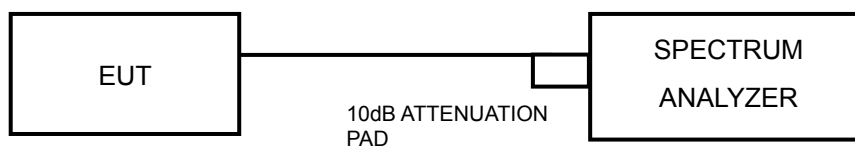
Measurement Procedure –Unwanted Emission Level

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.7.7 TEST RESULTS

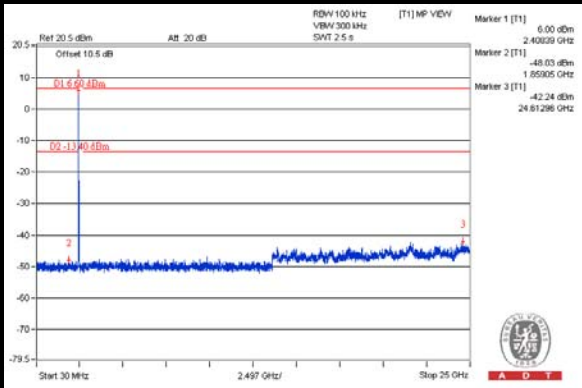
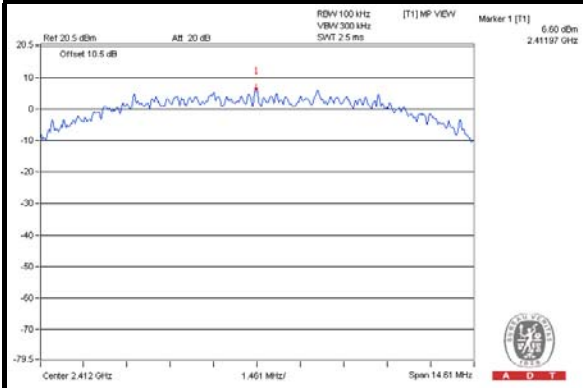
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



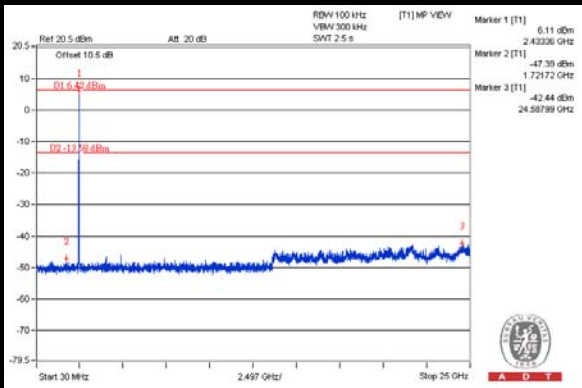
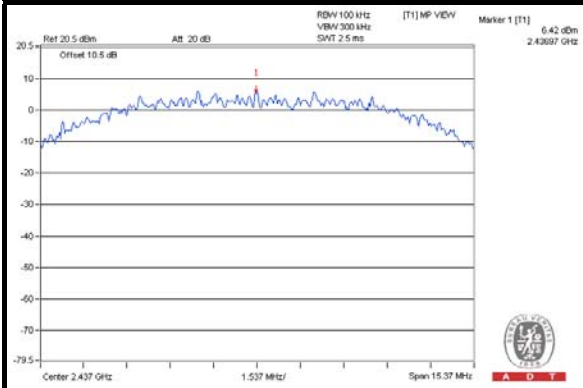
A D T

802.11b:

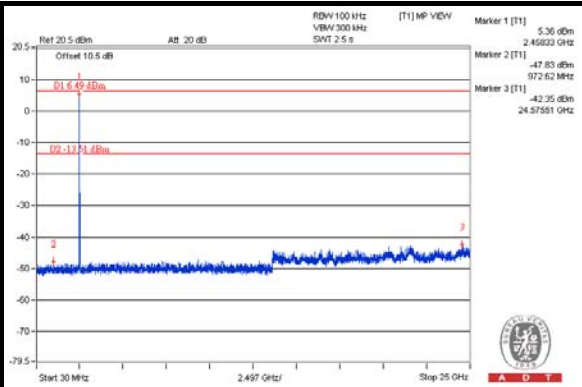
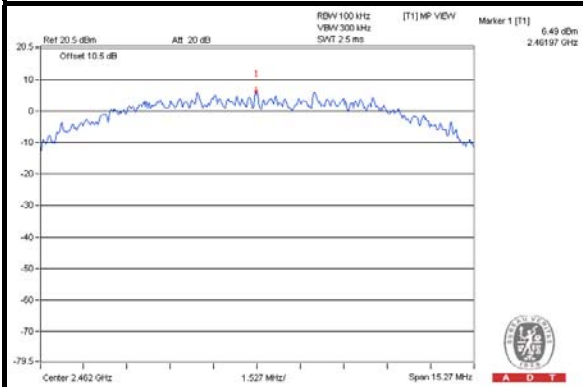
CH 1



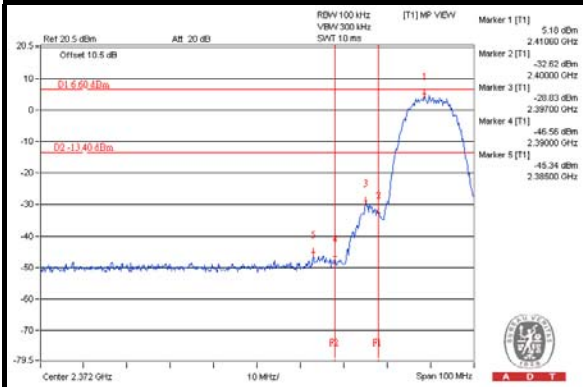
CH 6



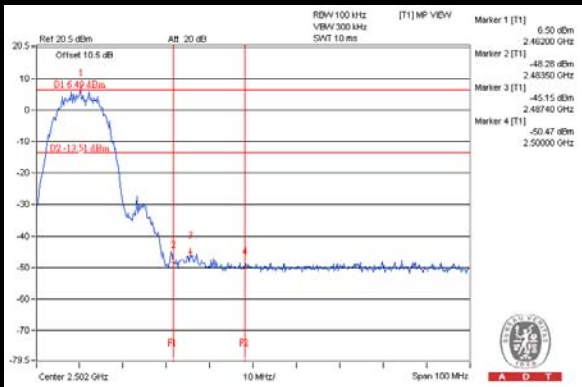
CH 11



CH 1 Band edge



CH 11 Band edge

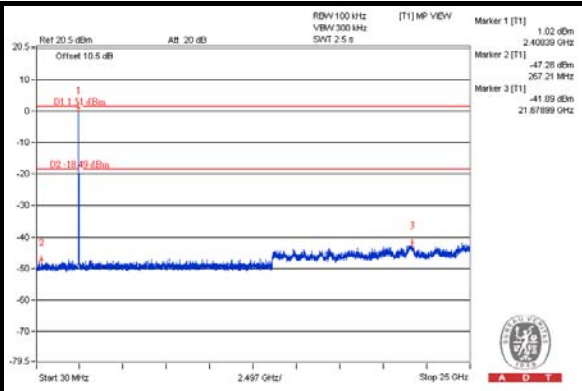
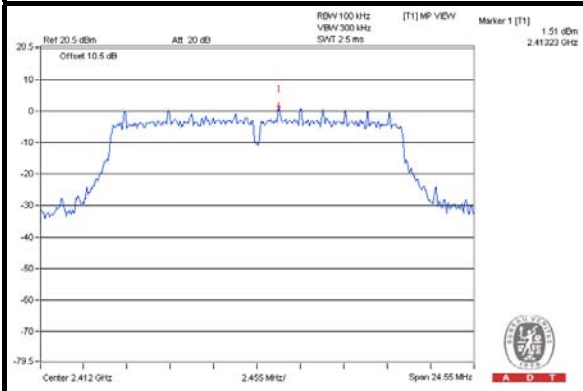




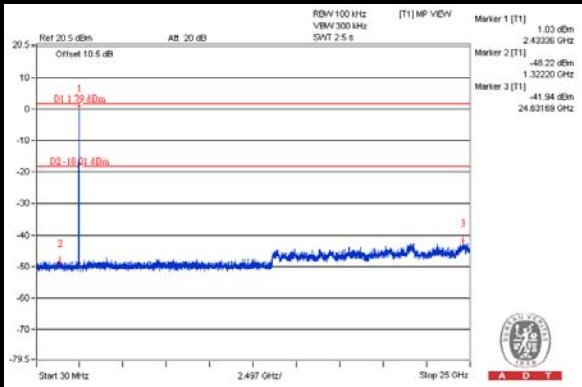
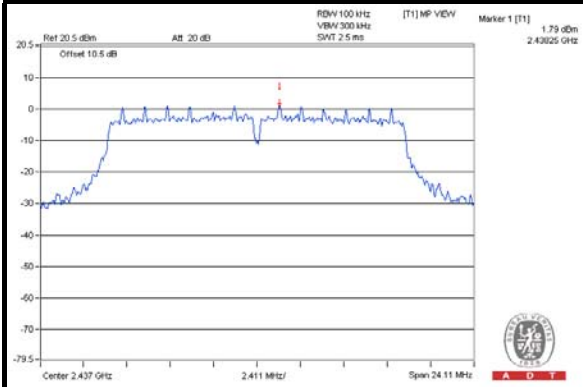
A D T

802.11g:

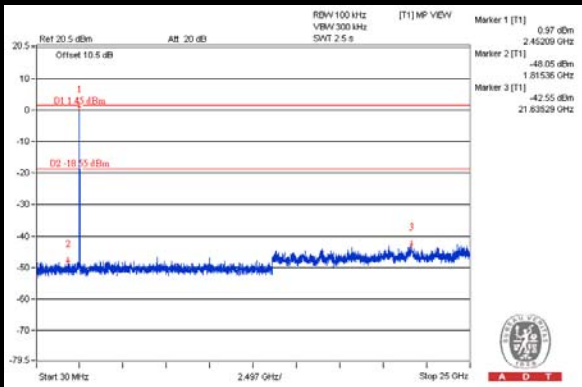
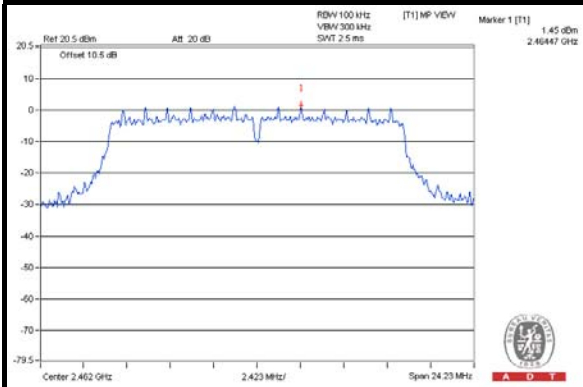
CH 1



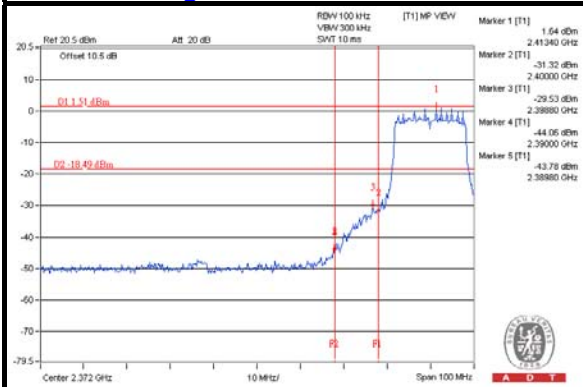
CH 6



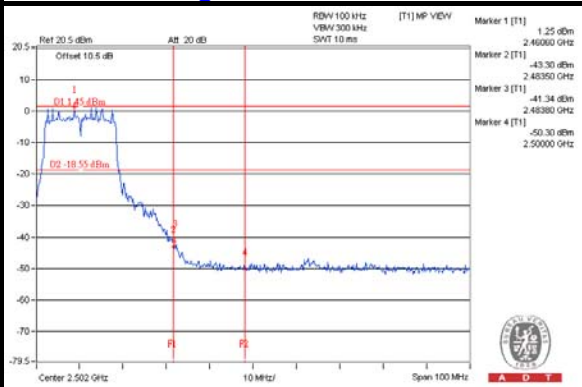
CH 11



CH 1 Band edge



CH 11 Band edge

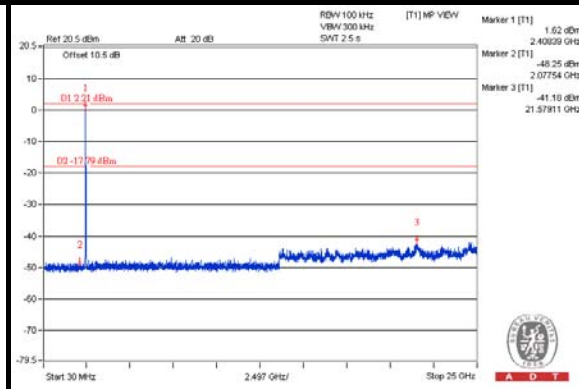
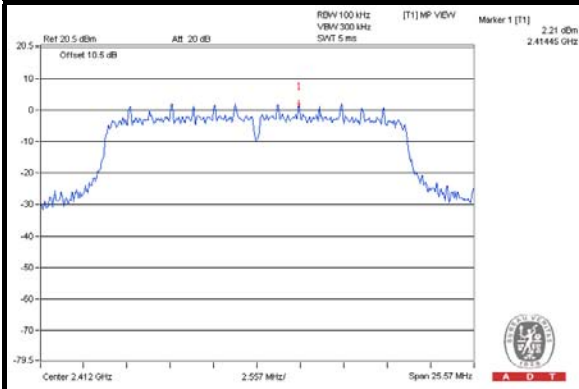




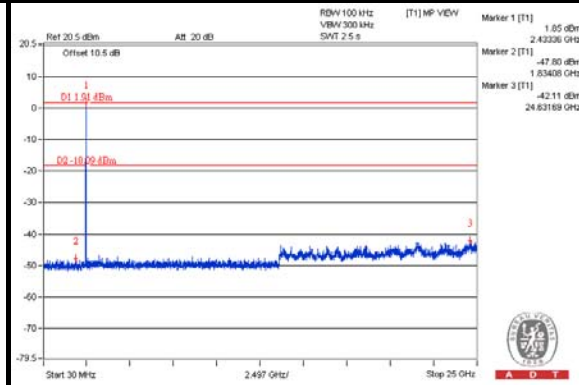
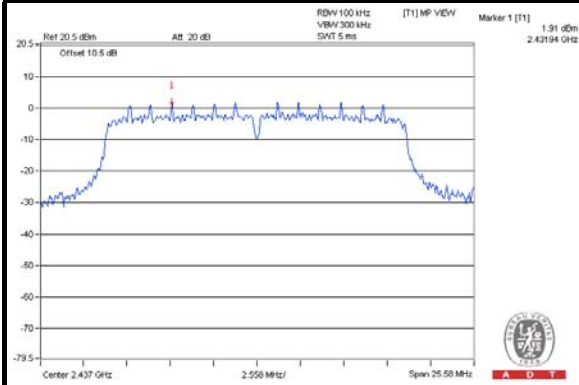
A D T

802.11n (HT20):

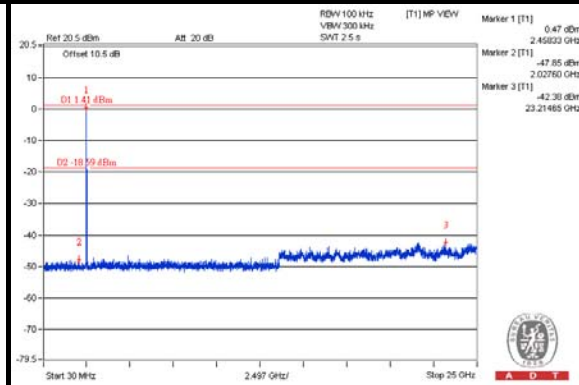
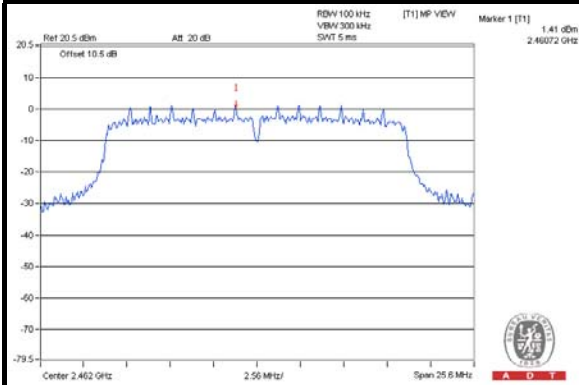
CH 1



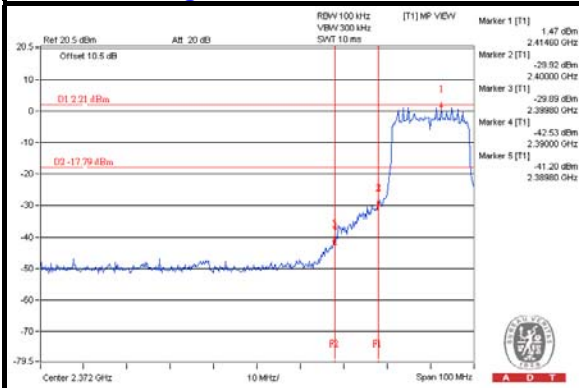
CH 6



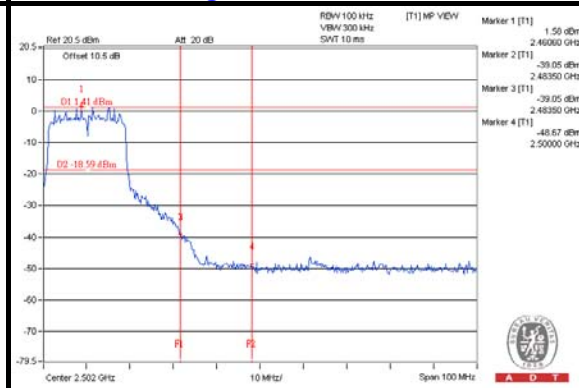
CH 11



CH 1 Band edge



CH 11 Band edge

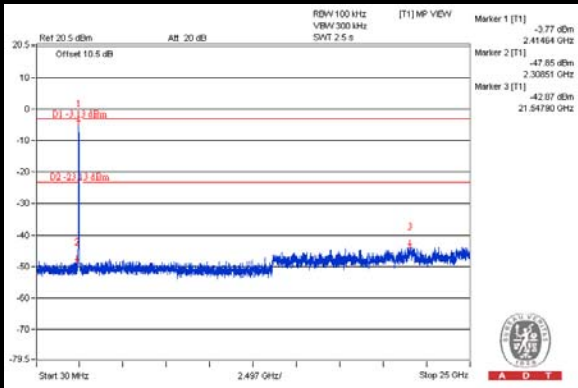
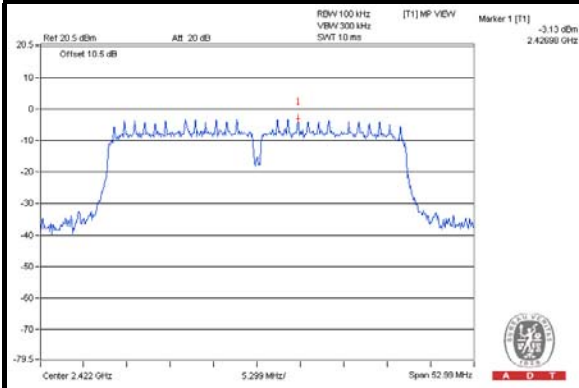




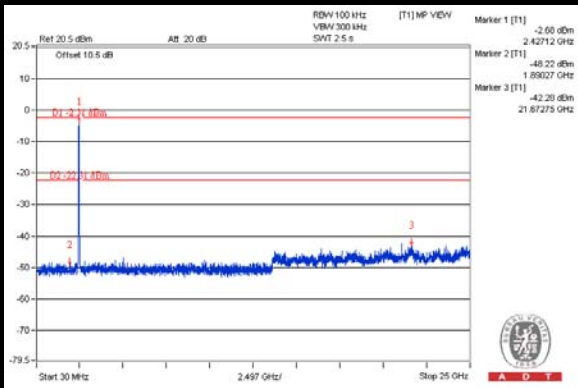
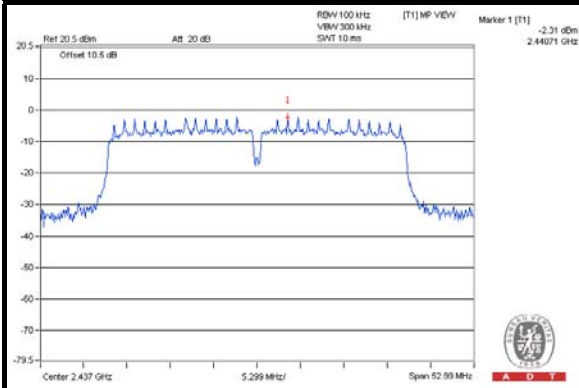
A D T

802.11n (HT40):

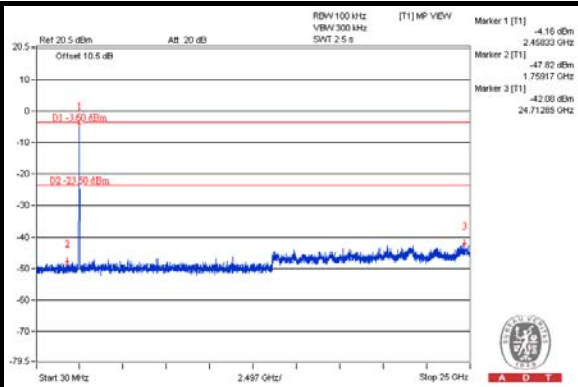
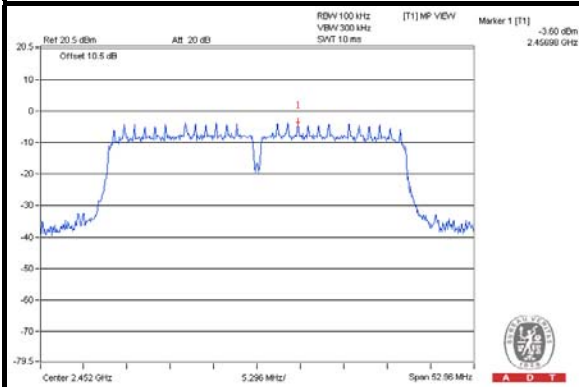
CH 3



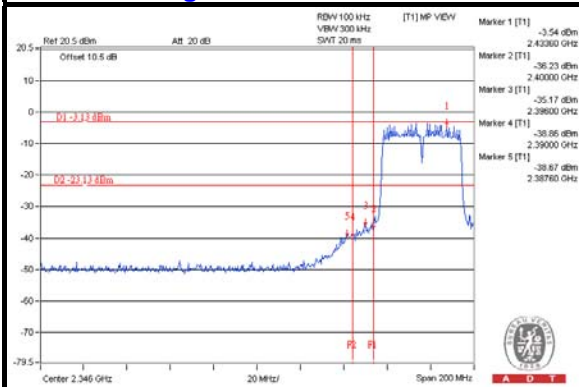
CH 6



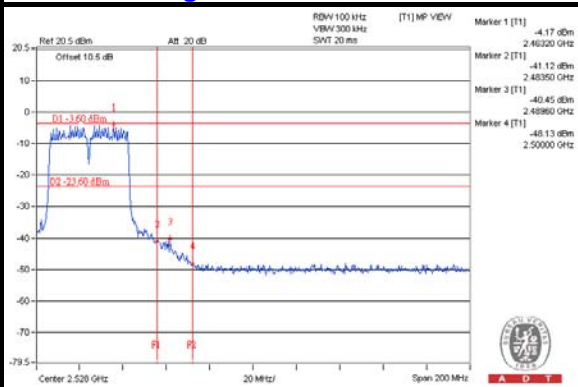
CH 9



CH 3 Band edge



CH 9 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:

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Fax: 886-2-26052943

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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.



A D T

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 ---