FCC TEST REPORT (15.247)

REPORT NO.:	RF140714E01A R1
MODEL NO.:	AT-TQ4600
FCC ID:	RSL-TQ4600
RECEIVED:	July 24, 2014
TESTED:	July 29 to Sep. 10, 2014
ISSUED:	Dec. 19, 2014
APPLICANT:	Allied Telesis R&D Center K.K.
ADDRESS:	2nd TOC Bldg. 7-21-11 Nishi-Gotanda, Shinagawa-ku, Tokyo 141-0031, Japan
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140714E01A	Original release	Nov. 06, 2014
RF140714E01A R1	Modified EUT's specification on section 3.1.	Dec. 19, 2014

1. CERTIFICATION

PRODUCT:	Access Point
BRAND NAME:	Allied Telesis
MODEL NO.:	AT-TQ4600
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Allied Telesis R&D Center K.K.
TESTED:	July 29 to Sep. 10, 2014
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: AT-TQ4600) 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:** Dec. 19, 2014
(Claire Kuan, Specialist)

APPROVED BY : _____ , **DATE:** Dec. 19, 2014
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.41dB at 0.31797MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2486.000MHz
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	Antenna connector is i-pex(MHF) not a standard connector.

NOTE: 1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.25GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Access Point
MODEL NO.	AT-TQ4600
POWER SUPPLY	DC 12V from power adapter or DC 48V from PoE
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20), VHT20 7 for 802.11n (HT40), VHT40
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 220.019mW 802.11ac (VHT20): 175.42mW 802.11ac (VHT40): 132.953mW 802.11ac (VHT80): 58.791mW **For 15.247** 802.11b: 126.474mW 802.11g: 362.092mW 802.11n (HT20): 275.13mW 802.11n (HT40): 118.624mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1 (Option)

NOTE:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The EUT could be supplied with a power adapter as following table:

Brand	Model No.	Spec.
Elementech	AU12412030	Input: 100-240V, 0.6A, 50/60Hz Output: 12.0V, 2A DC output cable(1.8m, unshielded)

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

For 2.4GHz used						
No.	Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain(dBi) Including cable loss	Connector type
1	Chain (0)	Aristotle	RFA-02-G133-70B-110R	PIFA	3.1	i-pex(MHF)
2	Chain (1)		RFA-02-G133-70B-58		3.17	
3	Chain (2)		RFA-02-G133-70B-180		1.75	
For 5GHz used						
No.	Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain(dBi) Including cable loss	Connector type
1	Chain (0)	Aristotle	RFA-05-G134-70-230C	PIFA	2.65	i-pex(MHF)
2	Chain (1)		RFA-05-G134-70-105C		4.15	
3	Chain (2)		RFA-05-G134-70-75C		4.04	

4. The EUT incorporates a MIMO function without beamforming.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	3RX
802.11g	6 ~ 54Mbps	1TX / 2TX (CDD) / 3TX (CDD)	3RX
802.11n (HT20) (2.4GHz)	MCS 0~7	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS 8~15	2TX / 3TX (CDD)	3RX
	MCS 16~23	3TX	3RX
	MCS0~8 Nss=1	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS0~8 Nss=2	2TX/ 3TX (CDD)	3RX
	MCS0~9Nss= 3	3TX	3RX
802.11n (HT40) (2.4GHz)	MCS 0~7	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS 8~15	2TX / 3TX (CDD)	3RX
	MCS 16~23	3TX	3RX
	MCS0~9 Nss=1	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS0~9 Nss=2	2TX / 3TX (CDD)	3RX
	MCS0~9 Nss= 3	3TX	3RX
802.11a	6 ~ 54Mbps	1TX / 2TX (CDD) / 3TX (CDD)	3RX
802.11n (HT20) (5GHz)	MCS 0~7	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS 8~15	2TX / 3TX (CDD)	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40) (5GHz)	MCS 0~7	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS 8~15	2TX / 3TX (CDD)	3RX
	MCS 16~23	3TX	3RX
802.11ac (VHT20) (5GHz)	MCS0~8 Nss=1	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS0~8 Nss=2	2TX / 3TX (CDD)	3RX
	MCS0~9 Nss= 3	3TX	3RX
802.11ac (VHT40) (5GHz)	MCS0~9 Nss=1	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS0~9 Nss=2	2TX / 3TX (CDD)	3RX
	MCS0~9 Nss= 3	3TX	3RX
802.11ac (VHT80) (5GHz)	MCS0~9 Nss=1	1TX / 2TX (CDD) / 3TX (CDD)	3RX
	MCS0~9 Nss=2	2TX / 3TX (CDD)	3RX
	MCS0~9 Nss= 3	3TX	3RX
*For 1TX mode will fix transmission on Chain (0).			

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

5. The EUT was pre-tested in chamber under the following modes:

Test Mode	Description
Mode A	Adapter mode
Mode B	**PoE mode**

From the above modes, the spurious emission worse case was found in **Mode B**.

Therefore only the test data of the mode was recorded in this report.

6. Spurious emission of the simultaneous operation (2.4GHz and 5GHz) has been evaluated and no non-compliance was found.
7. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), 802.11n (HT20), VHT20:

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), 802.11n (HT40), VHT40:

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

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz

RE ³ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

OB: Conducted Out-Band Emission Measurement

NOTE: 1. The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **Y-plane**.

POWER LINE CONDUCTED EMISSION TEST:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	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	6	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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	22deg. C, 72%RH	120Vac, 60Hz	Andy Ho
RE≥1G	22deg. C, 66%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r02

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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.

3.4 DUTY CYCLE OF TEST SIGNAL

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

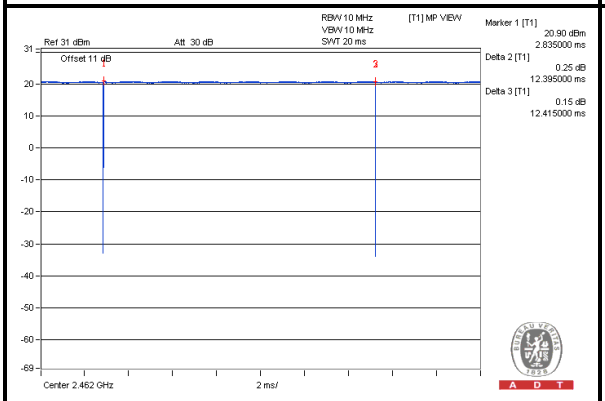
802.11b: Duty cycle = 12.395 ms/12.415 ms = 0.998

802.11g: Duty cycle = 2.061 ms/2.08 ms = 0.991

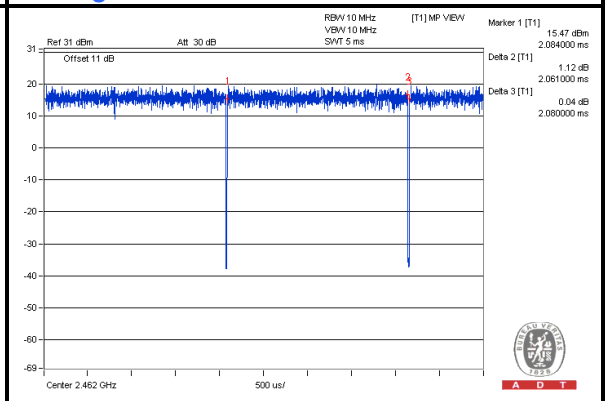
802.11n (HT20): Duty cycle = 1.916 ms/1.938 ms = 0.989

802.11n (HT40): Duty cycle = 0.939 ms/0.958 ms = 0.98

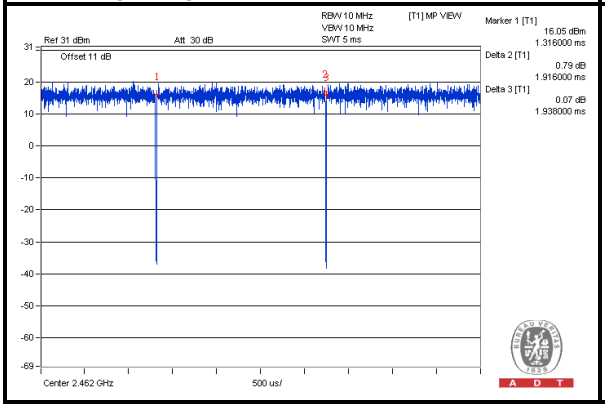
802.11b



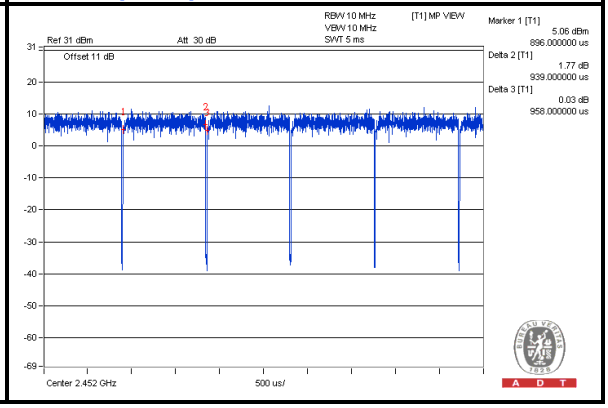
802.11g



802.11n (HT20)



802.11n (HT40)



3.5 DESCRIPTION OF SUPPORT UNITS

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

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B	PoE	Power Dsine	PD-3501G/ AC	NA	NA	Supplied by Client

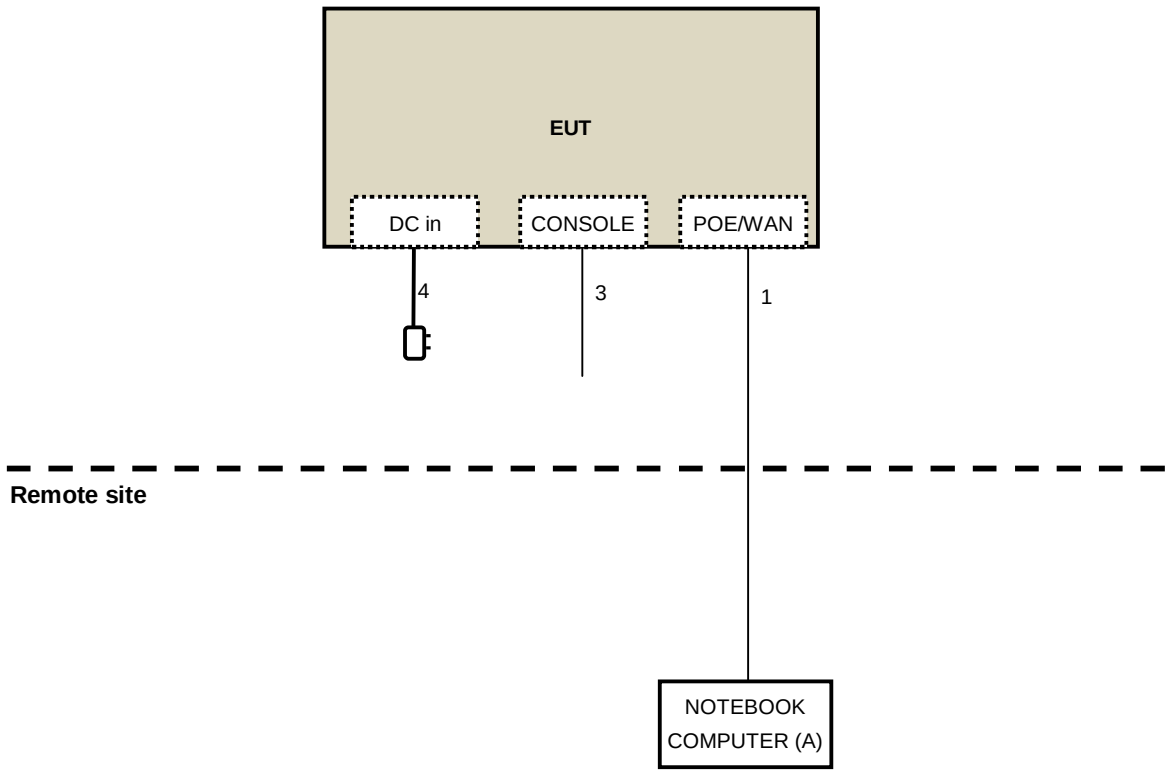
NOTE:

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

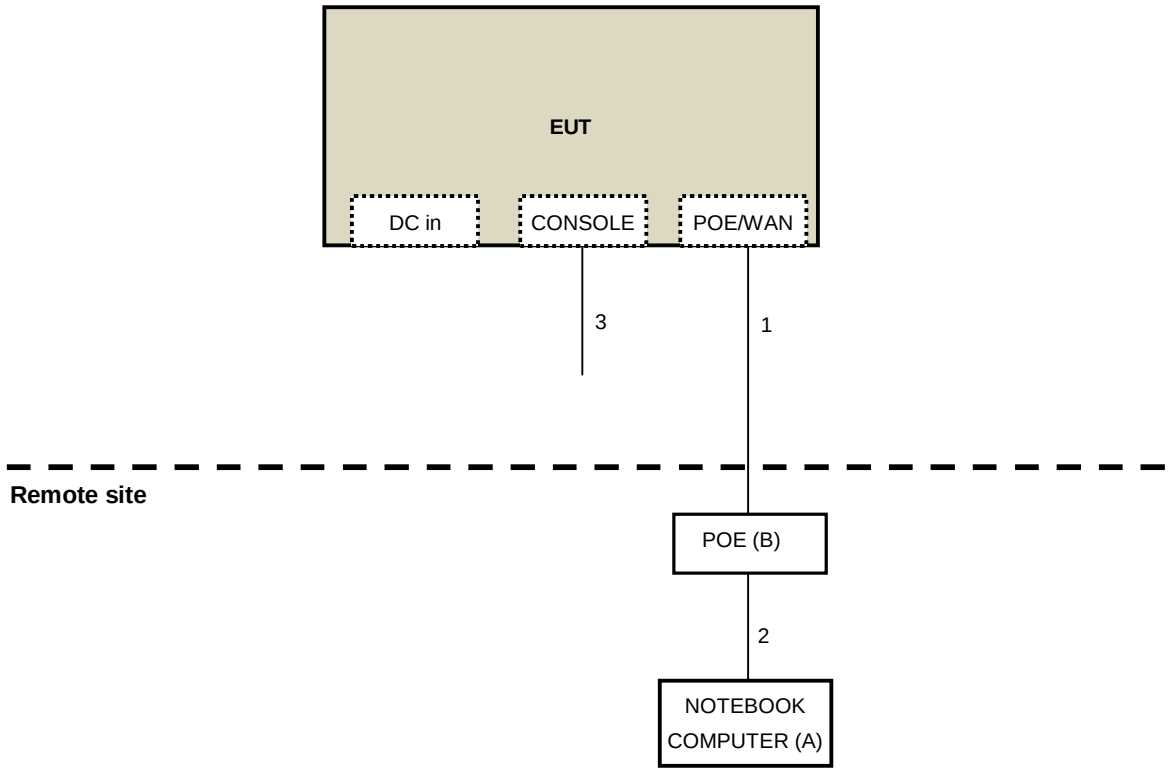
No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1.	RJ45	1	10	No	0	Provided by Lab
2.	RJ45	1	3	No	0	Provided by Lab
3.	RJ45 to RS-232	1	1.5	No	0	Provided by Lab
4.	DC	1	1.8	No	0	Supplied by Client

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Adapter Mode:



For PoE Mode:


EUT
DC in
CONSOLE
POE/WAN
3
1
Remote site
POE (B)
2
NOTEBOOK
COMPUTER (A)

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	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Oct. 02, 2013	Oct. 01, 2014
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 24, 2013	Sep. 23, 2014
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Aug. 05, 2014

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.

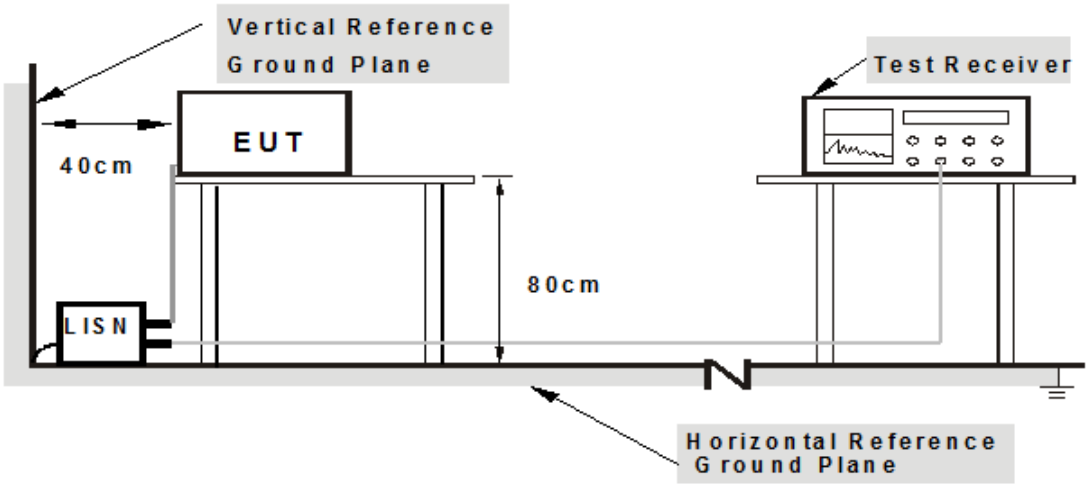
NOTE:

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 all equipment.
2. The support unit A (Notebook Computer) runs “Mtool.exe [V1.0.0.10]” program to enable EUT under transmission/receiving condition continuously at specific channel frequency.

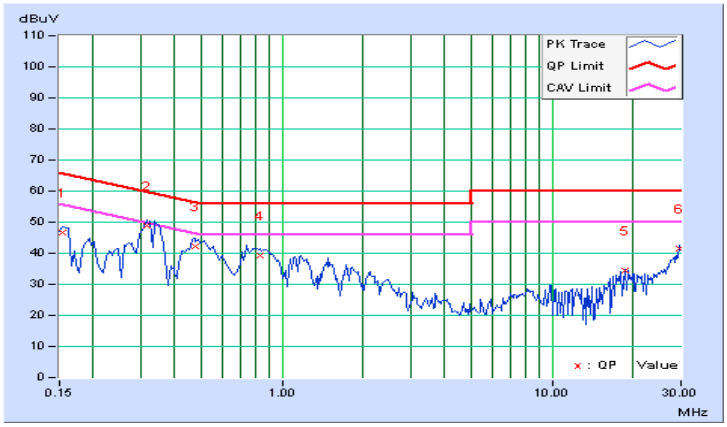
4.1.7 TEST RESULTS (MODE 1)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	46.46	40.68	46.53	40.75	65.79	55.79	-19.26	-15.04
2	**0.31797**	**0.08**	**48.63**	**42.27**	**48.71**	**42.35**	**59.76**	**49.76**	**-11.05**	**-7.41**
3	0.47422	0.09	42.11	35.59	42.20	35.68	56.44	46.44	-14.23	-10.75
4	0.82578	0.12	39.17	32.28	39.29	32.40	56.00	46.00	-16.71	-13.60
5	18.52344	0.67	33.76	33.74	34.43	34.41	60.00	50.00	-25.57	-15.59
6	29.64063	0.99	40.46	40.13	41.45	41.12	60.00	50.00	-18.55	-8.88

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

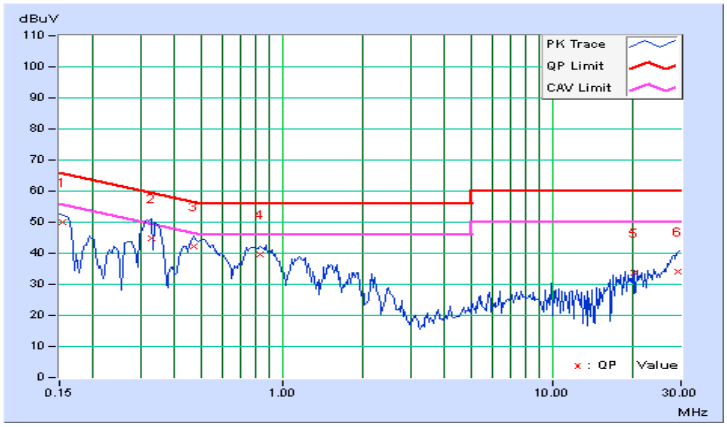


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	49.98	41.94	50.05	42.01	65.79	55.79	-15.73	-13.77
2	0.32969	0.08	44.91	28.71	44.99	28.79	59.46	49.46	-14.47	-20.67
3	0.47031	0.09	42.30	36.51	42.39	36.60	56.51	46.51	-14.11	-9.90
4	0.82969	0.12	39.53	32.69	39.65	32.81	56.00	46.00	-16.35	-13.19
5	20.25391	0.71	33.09	33.05	33.80	33.76	60.00	50.00	-26.20	-16.24
6	29.38672	0.97	33.25	30.47	34.22	31.44	60.00	50.00	-25.78	-18.56

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



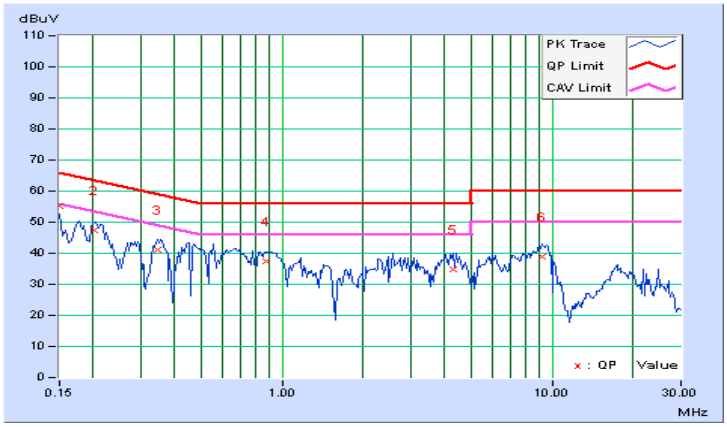
4.1.8 TEST RESULTS (MODE 2)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.07	54.97	39.86	55.04	39.93	66.00	56.00	-10.96	-16.07
2	0.20078	0.07	47.36	33.04	47.43	33.11	63.58	53.58	-16.15	-20.47
3	0.34531	0.08	40.98	31.21	41.06	31.29	59.07	49.07	-18.01	-17.78
4	0.87266	0.12	37.27	26.07	37.39	26.19	56.00	46.00	-18.61	-19.81
5	4.32422	0.27	34.53	25.08	34.80	25.35	56.00	46.00	-21.20	-20.65
6	9.17578	0.42	38.42	28.79	38.84	29.21	60.00	50.00	-21.16	-20.79

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

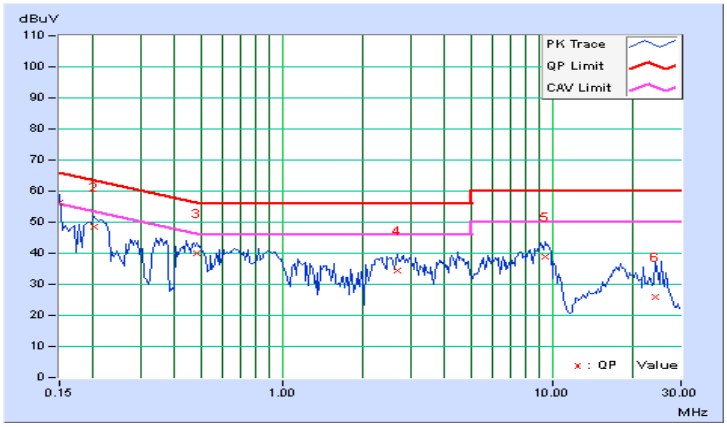


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	56.32	39.17	56.40	39.25	66.00	56.00	-9.60	-16.75
2	0.20078	0.07	48.52	34.40	48.59	34.47	63.58	53.58	-14.99	-19.11
3	0.48216	0.10	39.90	28.76	40.00	28.86	56.30	46.30	-16.31	-17.45
4	2.66406	0.21	34.38	24.26	34.59	24.47	56.00	46.00	-21.41	-21.53
5	9.40234	0.43	38.61	30.22	39.04	30.65	60.00	50.00	-20.96	-19.35
6	24.01172	0.81	25.16	17.77	25.97	18.58	60.00	50.00	-34.03	-31.42

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



4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

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

4.2.2 TEST INSTRUMENTS

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. 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: July 29, 2014

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Sep. 09, 2014

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

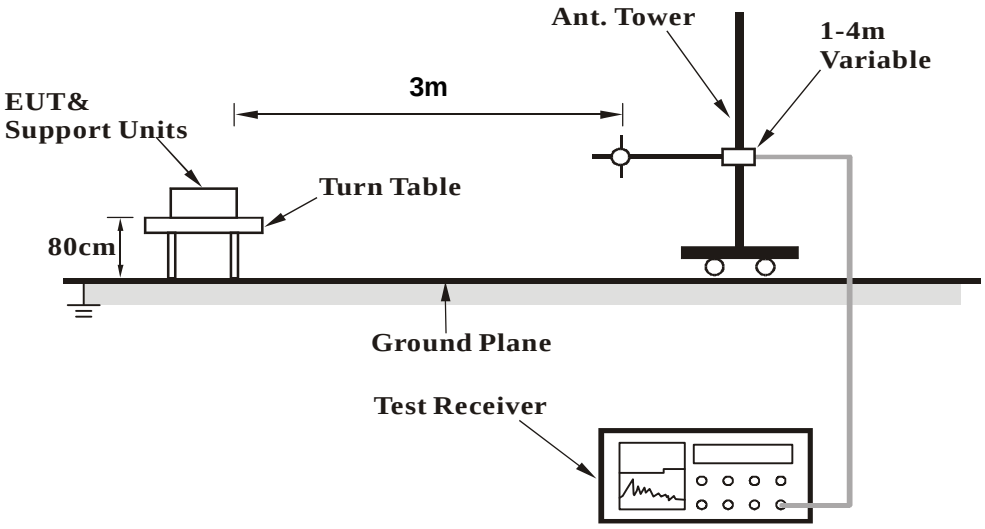
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 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

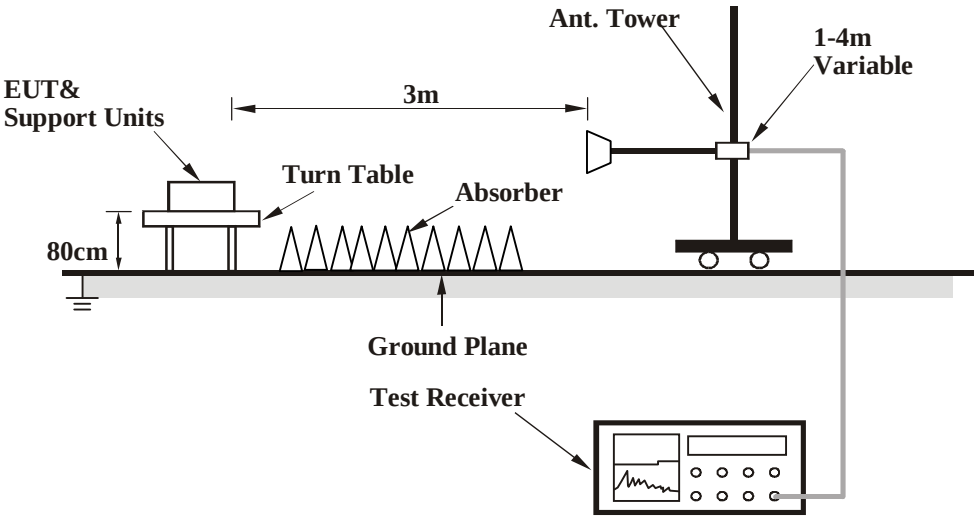
No deviation

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 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	69.87	32.0 QP	40.0	-8.0	2.00 H	267	47.45	-15.48
2	104.98	36.3 QP	43.5	-7.3	2.00 H	82	53.24	-16.99
3	227.49	35.5 QP	46.0	-10.5	1.50 H	278	51.58	-16.05
4	258.58	37.3 QP	46.0	-8.7	1.50 H	131	51.26	-13.99
5	800.08	38.6 QP	46.0	-7.4	1.00 H	0	40.02	-1.41
6	860.85	39.7 QP	46.0	-6.3	1.50 H	360	40.43	-0.69
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	38.05	34.5 QP	40.0	-5.5	1.00 V	178	48.40	-13.92
2	**69.89**	**34.9 QP**	**40.0**	**-5.1**	**1.00 V**	**157**	**50.42**	**-15.48**
3	107.94	32.9 QP	43.5	-10.6	2.00 V	244	49.44	-16.51
4	200.04	33.6 QP	43.5	-9.9	1.00 V	253	49.94	-16.30
5	266.05	37.6 QP	46.0	-8.4	2.00 V	360	51.22	-13.63
6	644.54	37.3 QP	46.0	-8.7	1.50 V	174	41.37	-4.08

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	2389.00	56.1 PK	74.0	-17.9	1.03 H	325	61.71	-5.61
2	2389.00	49.4 AV	54.0	-4.6	1.03 H	325	55.01	-5.61
3	*2412.00	109.2 PK			1.03 H	325	114.73	-5.53
4	*2412.00	106.4 AV			1.03 H	325	111.93	-5.53
5	2490.00	50.1 PK	74.0	-23.9	1.12 H	312	55.28	-5.18
6	2490.00	40.2 AV	54.0	-13.8	1.12 H	312	45.38	-5.18
7	4824.00	51.7 PK	74.0	-22.3	1.49 H	53	47.84	3.86
8	4824.00	44.2 AV	54.0	-9.8	1.49 H	53	40.34	3.86
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	2389.00	58.4 PK	74.0	-15.6	1.18 V	33	64.01	-5.61
2	2389.00	52.3 AV	54.0	-1.7	1.18 V	33	57.91	-5.61
3	*2412.00	109.6 PK			1.18 V	33	115.13	-5.53
4	*2412.00	107.2 AV			1.18 V	33	112.73	-5.53
5	2490.00	51.3 PK	74.0	-22.7	1.16 V	199	56.48	-5.18
6	2490.00	41.9 AV	54.0	-12.1	1.16 V	199	47.08	-5.18
7	4824.00	51.9 PK	74.0	-22.1	1.24 V	165	48.04	3.86
8	4824.00	43.2 AV	54.0	-10.8	1.24 V	165	39.34	3.86

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	108.9 PK			1.00 H	322	114.32	-5.42
2	*2437.00	105.8 AV			1.00 H	322	111.22	-5.42
3	4874.00	51.6 PK	74.0	-22.4	1.47 H	53	47.79	3.81
4	4874.00	44.2 AV	54.0	-9.8	1.47 H	53	40.39	3.81
5	7311.00	52.6 PK	74.0	-21.4	1.32 H	257	44.37	8.23
6	7311.00	43.0 AV	54.0	-11.0	1.32 H	257	34.77	8.23
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	109.3 PK			1.19 V	40	114.72	-5.42
2	*2437.00	106.6 AV			1.19 V	40	112.02	-5.42
3	4874.00	51.3 PK	74.0	-22.7	1.27 V	153	47.49	3.81
4	4874.00	42.8 AV	54.0	-11.2	1.27 V	153	38.99	3.81
5	7311.00	54.8 PK	74.0	-19.2	1.00 V	178	46.57	8.23
6	7311.00	44.6 AV	54.0	-9.4	1.00 V	178	36.37	8.23

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	108.7 PK			1.03 H	317	114.01	-5.31
2	*2462.00	105.3 AV			1.03 H	317	110.61	-5.31
3	2483.50	56.8 PK	74.0	-17.2	1.03 H	317	62.00	-5.20
4	2483.50	49.8 AV	54.0	-4.2	1.03 H	317	55.00	-5.20
5	4924.00	51.9 PK	74.0	-22.1	1.47 H	44	48.10	3.80
6	4924.00	44.4 AV	54.0	-9.6	1.47 H	44	40.60	3.80
7	7386.00	52.4 PK	74.0	-21.6	1.30 H	257	43.85	8.55
8	7386.00	42.8 AV	54.0	-11.2	1.30 H	257	34.25	8.55
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	109.1 PK			1.16 V	36	114.41	-5.31
2	*2462.00	106.1 AV			1.16 V	36	111.41	-5.31
3	4924.00	51.5 PK	74.0	-22.5	1.22 V	155	47.70	3.80
4	4924.00	43.1 AV	54.0	-10.9	1.22 V	155	39.30	3.80
5	7386.00	55.3 PK	74.0	-18.7	1.78 V	332	46.75	8.55
6	7386.00	45.9 AV	54.0	-8.1	1.78 V	332	37.35	8.55

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	72.1 PK	74.0	-1.9	1.07 H	318	77.70	-5.60
2	2390.00	50.3 AV	54.0	-3.7	1.07 H	318	55.90	-5.60
3	*2412.00	112.9 PK			1.07 H	318	118.43	-5.53
4	*2412.00	102.8 AV			1.07 H	318	108.33	-5.53
5	4824.00	51.9 PK	74.0	-22.1	1.51 H	60	48.04	3.86
6	4824.00	44.5 AV	54.0	-9.5	1.51 H	60	40.64	3.86
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	72.9 PK	74.0	-1.1	1.19 V	203	78.50	-5.60
2	2390.00	51.3 AV	54.0	-2.7	1.19 V	203	56.90	-5.60
3	*2412.00	113.3 PK			1.19 V	203	118.83	-5.53
4	*2412.00	103.1 AV			1.19 V	203	108.63	-5.53
5	4824.00	53.2 PK	74.0	-20.8	1.18 V	163	49.34	3.86
6	4824.00	44.2 AV	54.0	-9.8	1.18 V	163	40.34	3.86

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.3 PK	74.0	-10.7	1.07 H	321	68.90	-5.60
2	2390.00	44.3 AV	54.0	-9.7	1.07 H	321	49.90	-5.60
3	*2437.00	117.1 PK			1.07 H	321	122.52	-5.42
4	*2437.00	106.8 AV			1.07 H	321	112.22	-5.42
5	2483.50	62.1 PK	74.0	-11.9	1.07 H	321	67.30	-5.20
6	2483.50	43.6 AV	54.0	-10.4	1.07 H	321	48.80	-5.20
7	4874.00	51.4 PK	74.0	-22.6	1.47 H	47	47.59	3.81
8	4874.00	44.1 AV	54.0	-9.9	1.47 H	47	40.29	3.81
9	7311.00	52.1 PK	74.0	-21.9	1.31 H	248	43.87	8.23
10	7311.00	42.7 AV	54.0	-11.3	1.31 H	248	34.47	8.23
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	63.4 PK	74.0	-10.6	1.16 V	206	69.00	-5.60
2	2390.00	42.6 AV	54.0	-11.4	1.16 V	206	48.20	-5.60
3	*2437.00	116.3 PK			1.16 V	206	121.72	-5.42
4	*2437.00	106.0 AV			1.16 V	206	111.42	-5.42
5	2483.50	64.8 PK	74.0	-9.2	1.16 V	206	70.00	-5.20
6	2483.50	45.1 AV	54.0	-8.9	1.16 V	206	50.30	-5.20
7	4874.00	52.5 PK	74.0	-21.5	1.21 V	172	48.69	3.81
8	4874.00	43.8 AV	54.0	-10.2	1.21 V	172	39.99	3.81
9	7311.00	55.3 PK	74.0	-18.7	1.70 V	340	47.07	8.23
10	7311.00	45.7 AV	54.0	-8.3	1.70 V	340	37.47	8.23

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	113.2 PK			1.04 H	328	118.51	-5.31
2	*2462.00	102.9 AV			1.04 H	328	108.21	-5.31
3	2483.50	72.6 PK	74.0	-1.4	1.04 H	328	77.80	-5.20
4	2483.50	52.2 AV	54.0	-1.8	1.04 H	328	57.40	-5.20
5	4924.00	51.2 PK	74.0	-22.8	1.49 H	52	47.40	3.80
6	4924.00	43.9 AV	54.0	-10.1	1.49 H	52	40.10	3.80
7	7386.00	52.6 PK	74.0	-21.4	1.29 H	259	44.05	8.55
8	7386.00	43.1 AV	54.0	-10.9	1.29 H	259	34.55	8.55
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	114.1 PK			1.16 V	206	119.41	-5.31
2	*2462.00	103.6 AV			1.16 V	206	108.91	-5.31
3	2483.50	72.1 PK	74.0	-1.9	1.16 V	206	77.30	-5.20
4	2483.50	51.0 AV	54.0	-3.0	1.16 V	206	56.20	-5.20
5	4924.00	52.0 PK	74.0	-22.0	1.18 V	167	48.20	3.80
6	4924.00	43.5 AV	54.0	-10.5	1.18 V	167	39.70	3.80
7	7386.00	55.6 PK	74.0	-18.4	1.73 V	329	47.05	8.55
8	7386.00	45.9 AV	54.0	-8.1	1.73 V	329	37.35	8.55

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	72.9 PK	74.0	-1.1	1.09 H	321	78.50	-5.60
2	2390.00	51.3 AV	54.0	-2.7	1.09 H	321	56.90	-5.60
3	*2412.00	112.0 PK			1.09 H	321	117.53	-5.53
4	*2412.00	101.2 AV			1.09 H	321	106.73	-5.53
5	4824.00	50.6 PK	74.0	-23.4	1.56 H	82	46.74	3.86
6	4824.00	43.4 AV	54.0	-10.6	1.56 H	82	39.54	3.86
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	70.4 PK	74.0	-3.6	1.21 V	203	76.00	-5.60
2	2390.00	49.0 AV	54.0	-5.0	1.21 V	203	54.60	-5.60
3	*2412.00	113.5 PK			1.21 V	203	119.03	-5.53
4	*2412.00	103.4 AV			1.21 V	203	108.93	-5.53
5	4824.00	51.0 PK	74.0	-23.0	1.31 V	165	47.14	3.86
6	4824.00	42.6 AV	54.0	-11.4	1.31 V	165	38.74	3.86

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.2 PK	74.0	-10.8	1.13 H	307	68.80	-5.60
2	2390.00	44.4 AV	54.0	-9.6	1.13 H	307	50.00	-5.60
3	*2437.00	115.7 PK			1.13 H	307	121.12	-5.42
4	*2437.00	104.2 AV			1.13 H	307	109.62	-5.42
5	2483.50	62.3 PK	74.0	-11.7	1.06 H	310	67.50	-5.20
6	2483.50	43.7 AV	54.0	-10.3	1.06 H	310	48.90	-5.20
7	4874.00	50.2 PK	74.0	-23.8	1.53 H	68	46.39	3.81
8	4874.00	43.1 AV	54.0	-10.9	1.53 H	68	39.29	3.81
9	7311.00	52.1 PK	74.0	-21.9	1.35 H	275	43.87	8.23
10	7311.00	42.6 AV	54.0	-11.4	1.35 H	275	34.37	8.23
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	64.3 PK	74.0	-9.7	1.20 V	207	69.90	-5.60
2	2390.00	44.5 AV	54.0	-9.5	1.20 V	207	50.10	-5.60
3	*2437.00	117.2 PK			1.20 V	207	122.62	-5.42
4	*2437.00	106.4 AV			1.20 V	207	111.82	-5.42
5	2483.50	63.3 PK	74.0	-10.7	1.20 V	207	68.50	-5.20
6	2483.50	44.7 AV	54.0	-9.3	1.20 V	207	49.90	-5.20
7	4874.00	51.2 PK	74.0	-22.8	1.25 V	155	47.39	3.81
8	4874.00	43.1 AV	54.0	-10.9	1.25 V	155	39.29	3.81
9	7311.00	56.2 PK	74.0	-17.8	1.81 V	336	47.97	8.23
10	7311.00	46.5 AV	54.0	-7.5	1.81 V	336	38.27	8.23

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	111.4 PK			1.05 H	326	116.71	-5.31
2	*2462.00	100.7 AV			1.05 H	326	106.01	-5.31
3	2483.50	72.1 PK	74.0	-1.9	1.05 H	326	77.30	-5.20
4	2483.50	52.7 AV	54.0	-1.3	1.05 H	326	57.90	-5.20
5	4924.00	50.7 PK	74.0	-23.3	1.52 H	66	46.90	3.80
6	4924.00	43.5 AV	54.0	-10.5	1.52 H	66	39.70	3.80
7	7386.00	52.5 PK	74.0	-21.5	1.34 H	262	43.95	8.55
8	7386.00	42.9 AV	54.0	-11.1	1.34 H	262	34.35	8.55
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	112.0 PK			1.15 V	205	117.31	-5.31
2	*2462.00	101.5 AV			1.15 V	205	106.81	-5.31
3	2483.50	70.1 PK	74.0	-3.9	1.15 V	205	75.30	-5.20
4	2483.50	49.2 AV	54.0	-4.8	1.15 V	205	54.40	-5.20
5	4924.00	51.4 PK	74.0	-22.6	1.20 V	163	47.60	3.80
6	4924.00	43.1 AV	54.0	-10.9	1.20 V	163	39.30	3.80
7	7386.00	55.7 PK	74.0	-18.3	1.77 V	322	47.15	8.55
8	7386.00	46.1 AV	54.0	-7.9	1.77 V	322	37.55	8.55

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	2386.00	68.3 PK	74.0	-5.7	1.07 H	323	73.92	-5.62
2	2386.00	52.6 AV	54.0	-1.4	1.07 H	323	58.22	-5.62
3	*2422.00	108.5 PK			1.07 H	323	113.99	-5.49
4	*2422.00	97.9 AV			1.07 H	323	103.39	-5.49
5	4844.00	50.8 PK	74.0	-23.2	1.46 H	55	46.96	3.84
6	4844.00	44.0 AV	54.0	-10.0	1.46 H	55	40.16	3.84
7	7266.00	52.7 PK	74.0	-21.3	1.31 H	237	44.64	8.06
8	7266.00	43.3 AV	54.0	-10.7	1.31 H	237	35.24	8.06
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	68.1 PK	74.0	-5.9	1.17 V	204	73.72	-5.62
2	2386.00	52.3 AV	54.0	-1.7	1.17 V	204	57.92	-5.62
3	*2422.00	109.5 PK			1.17 V	201	114.99	-5.49
4	*2422.00	99.1 AV			1.17 V	201	104.59	-5.49
5	4844.00	52.2 PK	74.0	-21.8	1.22 V	154	48.36	3.84
6	4844.00	44.2 AV	54.0	-9.8	1.22 V	154	40.36	3.84
7	7266.00	55.5 PK	74.0	-18.5	1.70 V	325	47.44	8.06
8	7266.00	46.2 AV	54.0	-7.8	1.70 V	325	38.14	8.06

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	2386.00	69.2 PK	74.0	-4.8	1.06 H	323	74.82	-5.62
2	2386.00	50.4 AV	54.0	-3.6	1.06 H	323	56.02	-5.62
3	*2437.00	110.3 PK			1.06 H	323	115.72	-5.42
4	*2437.00	99.3 AV			1.06 H	323	104.72	-5.42
5	2486.00	70.4 PK	74.0	-3.6	1.06 H	323	75.60	-5.20
6	2486.00	51.6 AV	54.0	-2.4	1.06 H	323	56.80	-5.20
7	4874.00	50.7 PK	74.0	-23.3	1.45 H	53	46.89	3.81
8	4874.00	43.8 AV	54.0	-10.2	1.45 H	53	39.99	3.81
9	7311.00	52.4 PK	74.0	-21.6	1.35 H	247	44.17	8.23
10	7311.00	43.0 AV	54.0	-11.0	1.35 H	247	34.77	8.23
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	69.2 PK	74.0	-4.8	1.19 V	203	74.82	-5.62
2	2386.00	48.5 AV	54.0	-5.5	1.19 V	203	54.12	-5.62
3	*2437.00	111.5 PK			1.19 V	203	116.92	-5.42
4	*2437.00	100.6 AV			1.19 V	203	106.02	-5.42
5	**2486.00**	**73.0 PK**	**74.0**	**-1.0**	**1.19 V**	**203**	**78.20**	**-5.20**
6	2486.00	50.7 AV	54.0	-3.3	1.19 V	203	55.90	-5.20
7	4874.00	51.7 PK	74.0	-22.3	1.19 V	154	47.89	3.81
8	4874.00	43.7 AV	54.0	-10.3	1.19 V	154	39.89	3.81
9	7311.00	55.1 PK	74.0	-18.9	1.72 V	325	46.87	8.23
10	7311.00	45.9 AV	54.0	-8.1	1.72 V	325	37.67	8.23

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	105.8 PK			1.28 H	303	111.16	-5.36
2	*2452.00	95.3 AV			1.28 H	303	100.66	-5.36
3	2483.50	69.2 PK	74.0	-4.8	1.29 H	303	74.40	-5.20
4	2483.50	52.1 AV	54.0	-1.9	1.29 H	303	57.30	-5.20
5	4904.00	50.6 PK	74.0	-23.4	1.49 H	52	46.81	3.79
6	4904.00	43.4 AV	54.0	-10.6	1.49 H	52	39.61	3.79
7	7356.00	52.1 PK	74.0	-21.9	1.32 H	254	43.67	8.43
8	7356.00	42.6 AV	54.0	-11.4	1.32 H	254	34.17	8.43
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	107.4 PK			1.17 V	203	112.76	-5.36
2	*2452.00	96.7 AV			1.17 V	203	102.06	-5.36
3	2485.00	68.4 PK	74.0	-5.6	1.17 V	203	73.60	-5.20
4	2485.00	52.8 AV	54.0	-1.2	1.17 V	203	58.00	-5.20
5	4904.00	51.5 PK	74.0	-22.5	1.20 V	161	47.71	3.79
6	4904.00	43.4 AV	54.0	-10.6	1.20 V	161	39.61	3.79
7	7356.00	55.2 PK	74.0	-18.8	1.74 V	311	46.77	8.43
8	7356.00	45.7 AV	54.0	-8.3	1.74 V	311	37.27	8.43

REMARKS:

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

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 10, 2014

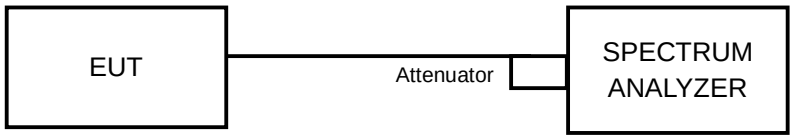
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.16	0.5	PASS
6	2437	11.07	0.5	PASS
11	2462	10.14	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	15.80	16.38	16.39	0.5	PASS
6	2437	16.13	15.75	16.41	0.5	PASS
11	2462	15.80	16.41	15.80	0.5	PASS

802.11n (HT20)

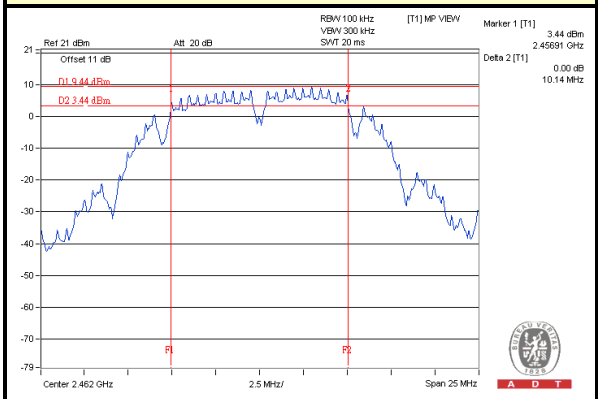
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.74	17.01	16.99	0.5	PASS
6	2437	16.74	17.02	17.65	0.5	PASS
11	2462	16.41	17.04	16.67	0.5	PASS

802.11n (HT40)

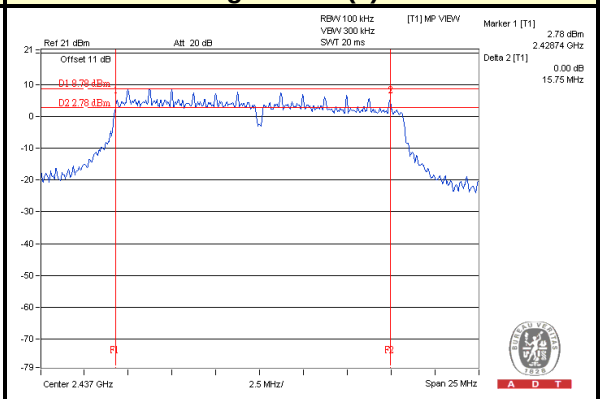
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.19	35.19	35.16	0.5	PASS
6	2437	35.93	35.82	35.93	0.5	PASS
9	2452	35.90	36.52	35.88	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

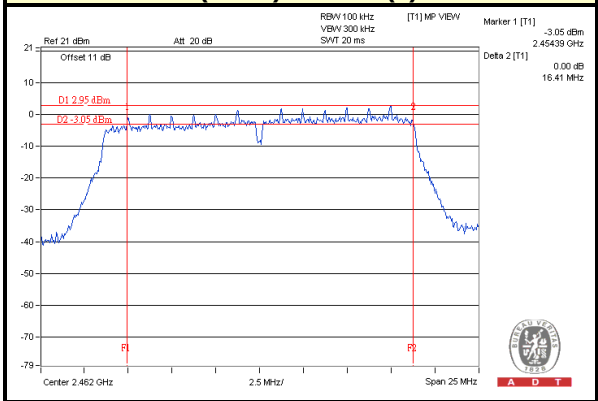
802.11b / CH11



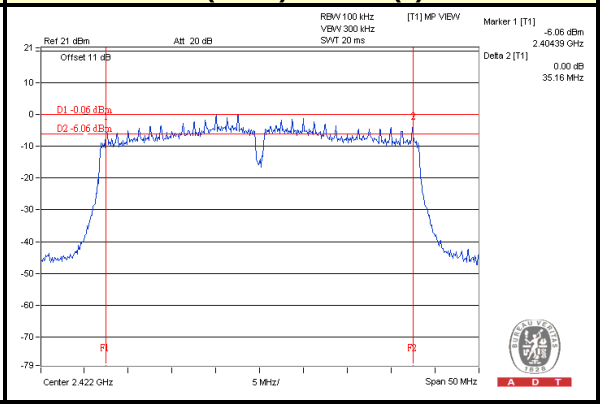
802.11g / Chain (1) : CH6



802.11n (HT20) / Chain (0) : CH11



802.11n (HT40) / Chain (2) : CH3



4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 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 ≥ 5.

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

4.4.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 10, 2014

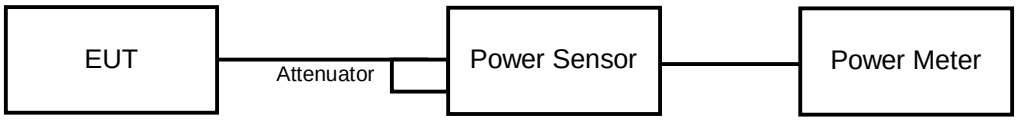
4.4.3 TEST PROCEDURES

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	126.183	21.01	30	PASS
6	2437	126.474	21.02	30	PASS
11	2462	99.083	19.96	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	16.81	17.39	17.29	156.381	21.94	30	PASS
6	2437	20.33	21.15	20.93	362.092	25.59	30	PASS
11	2462	15.47	15.96	15.91	113.677	20.56	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	15.86	16.47	16.31	125.665	20.99	30	PASS
6	2437	19.11	19.89	19.83	275.13	24.40	30	PASS
11	2462	14.12	14.57	14.51	82.714	19.18	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	13.45	13.96	13.92	71.68	18.55	30	PASS
6	2437	15.61	16.17	16.11	118.624	20.74	30	PASS
9	2452	11.27	11.54	11.47	41.681	16.20	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 INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 10, 2014

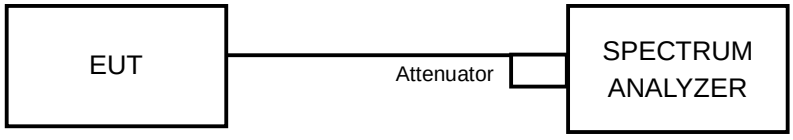
4.5.3 TEST PROCEDURE

1. Set the RBW = 10 kHz, VBW = 30 kHz, Detector = power averaging (RMS).
2. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW
3. Sweep time = auto couple,
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-8.90	8	PASS
6	2437	-9.26	8	PASS
11	2462	-10.78	8	PASS

802.11g

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-12.99	4.77	-8.22	6.53	PASS
	6	2437	-10.05	4.77	-5.28	6.53	PASS
	11	2462	-14.73	4.77	-9.96	6.53	PASS
1	1	2412	-13.74	4.77	-8.97	6.53	PASS
	6	2437	-9.95	4.77	-5.18	6.53	PASS
	11	2462	-15.18	4.77	-10.41	6.53	PASS
2	1	2412	-13.03	4.77	-8.26	6.53	PASS
	6	2437	-10.02	4.77	-5.25	6.53	PASS
	11	2462	-14.92	4.77	-10.15	6.53	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 7.47dBi > 6dBi , so the power density limit shall be reduced to 8-(7.47-6) = 6.53dBm.

802.11n (HT20)

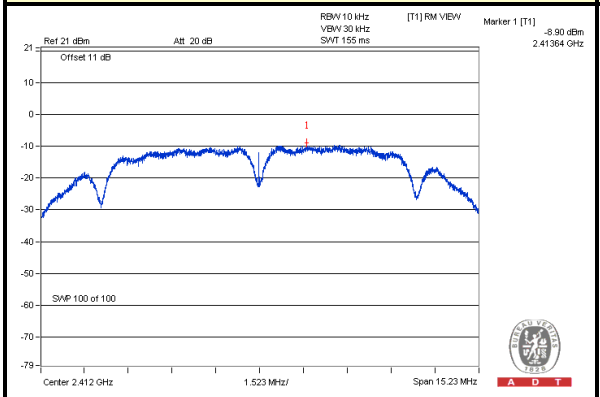
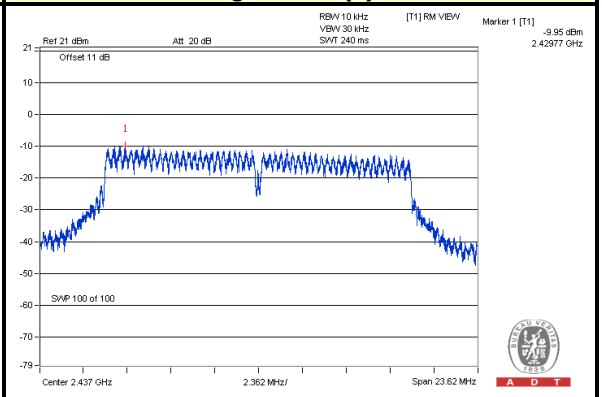
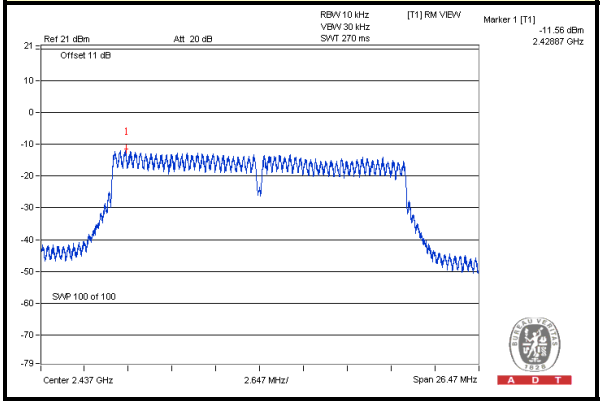
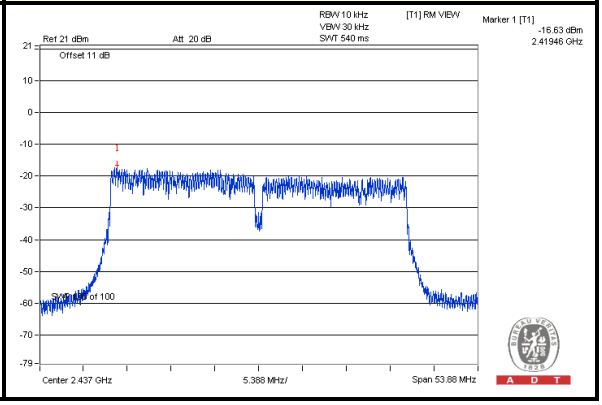
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-15.72	4.77	-10.95	6.53	PASS
	6	2437	-12.36	4.77	-7.59	6.53	PASS
	11	2462	-16.96	4.77	-12.19	6.53	PASS
1	1	2412	-15.64	4.77	-10.87	6.53	PASS
	6	2437	-12.24	4.77	-7.47	6.53	PASS
	11	2462	-17.25	4.77	-12.48	6.53	PASS
2	1	2412	-15.89	4.77	-11.12	6.53	PASS
	6	2437	-11.56	4.77	-6.79	6.53	PASS
	11	2462	-17.26	4.77	-12.49	6.53	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 7.47dBi > 6dBi , so the power density limit shall be reduced to 8-(7.47-6) = 6.53dBm.

802.11n (HT40)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	3	2422	-18.40	4.77	-13.63	6.53	PASS
	6	2437	-16.63	4.77	-11.86	6.53	PASS
	9	2452	-21.65	4.77	-16.88	6.53	PASS
1	3	2422	-20.08	4.77	-15.31	6.53	PASS
	6	2437	-17.89	4.77	-13.12	6.53	PASS
	9	2452	-22.18	4.77	-17.41	6.53	PASS
2	3	2422	-19.88	4.77	-15.11	6.53	PASS
	6	2437	-17.87	4.77	-13.10	6.53	PASS
	9	2452	-21.42	4.77	-16.65	6.53	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 7.47dBi > 6dBi , so the power density limit shall be reduced to 8-(7.47-6) = 6.53dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11b / CH1	**802.11g / Chain(1) : CH6**
	
802.11n (HT20) / Chain(2) : CH6	**802.11n (HT40) / Chain(0) : CH6**
	

4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 10, 2014

4.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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.

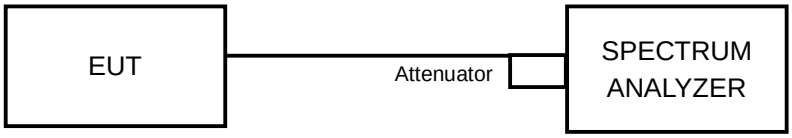
Measurement Procedure –Unwanted Emission Level

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

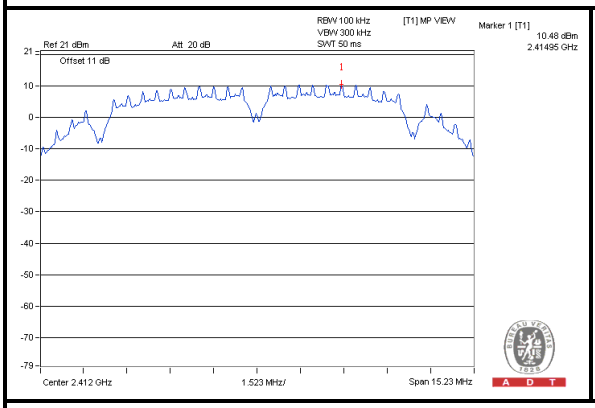
Same as Item 4.3.6

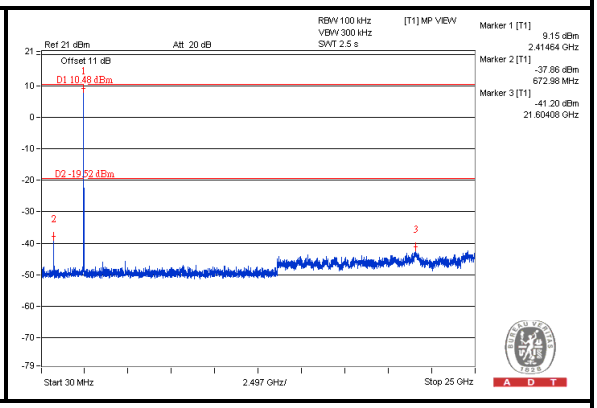
4.6.7 TEST RESULTS

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

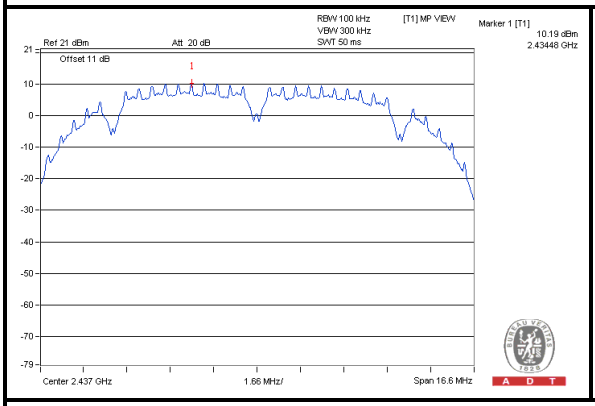
802.11b

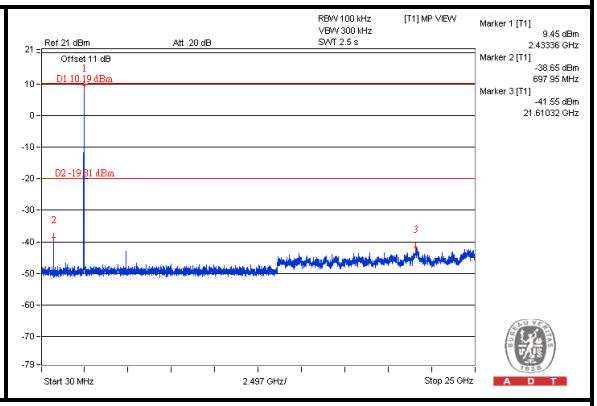
CH 1



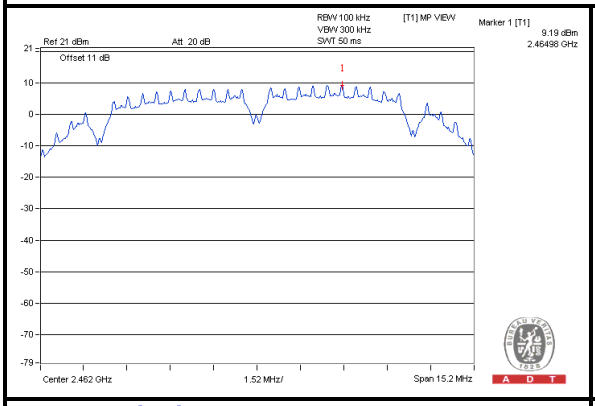


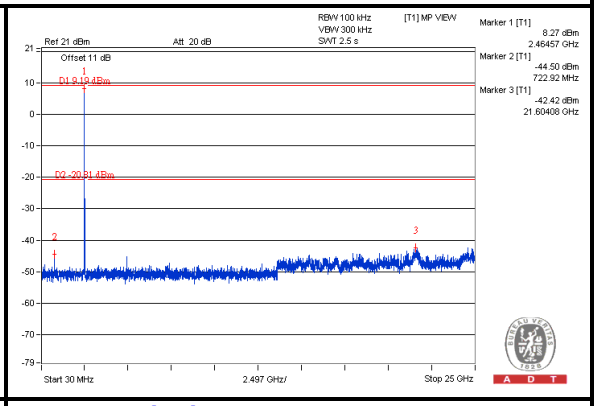
CH 6



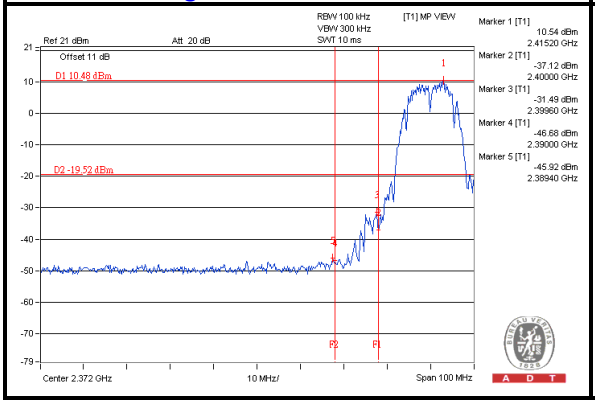


CH 11

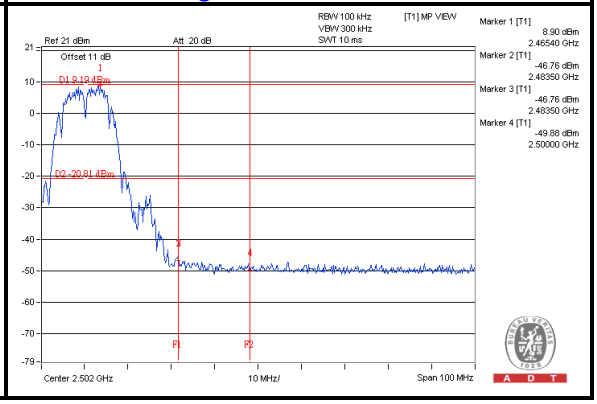




CH 1 Band edge



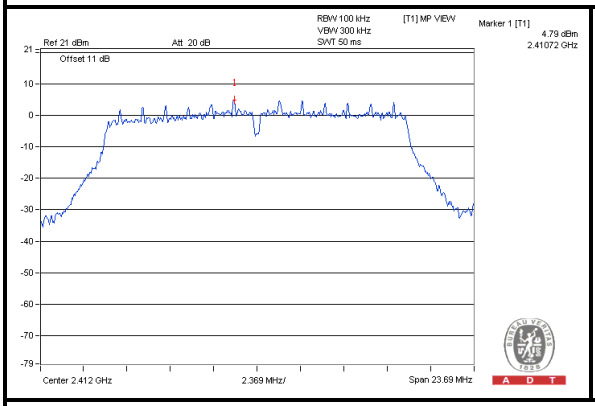
CH 11 Band edge

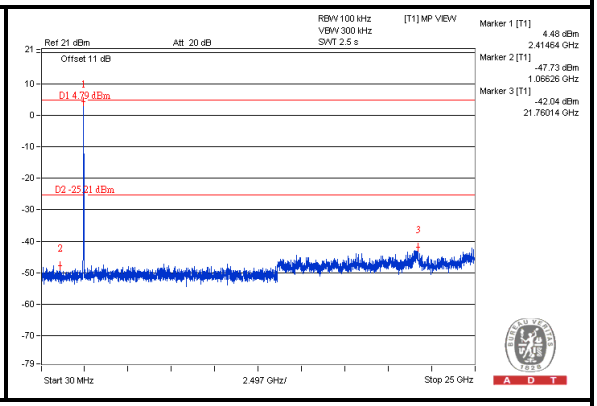


802.11g

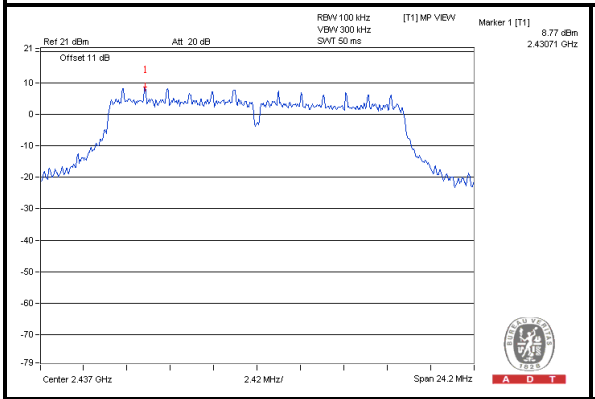
Chain(0)

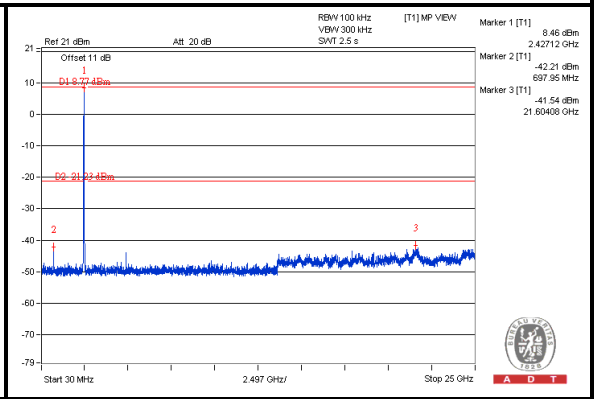
CH 1



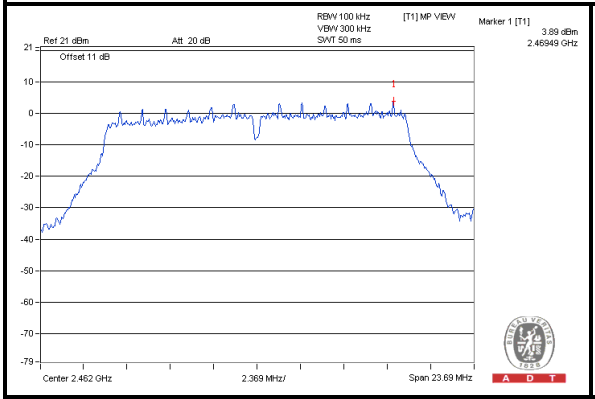


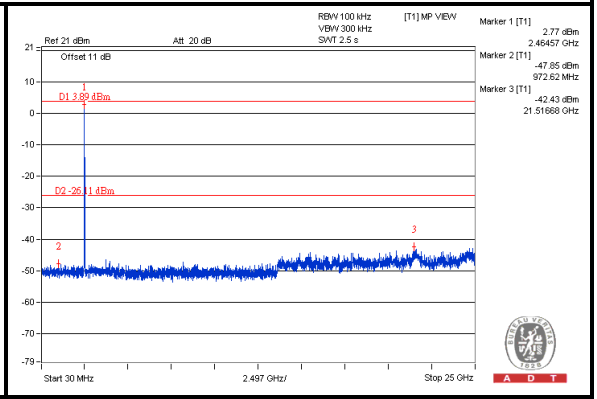
CH 6



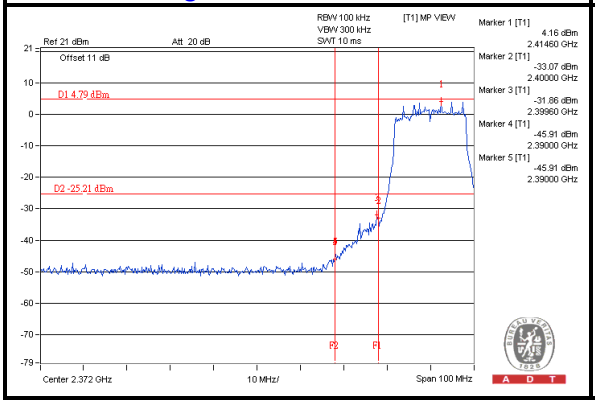


CH 11

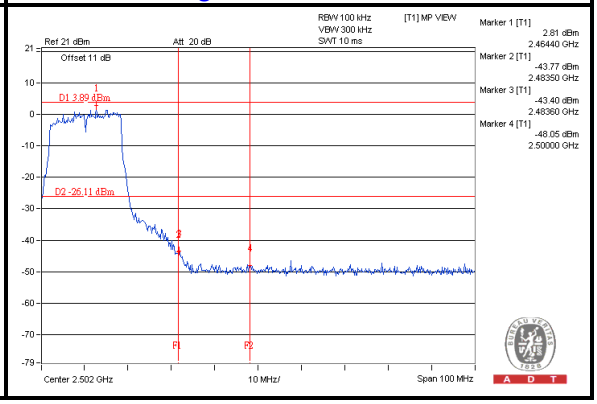




CH 1 Band edge



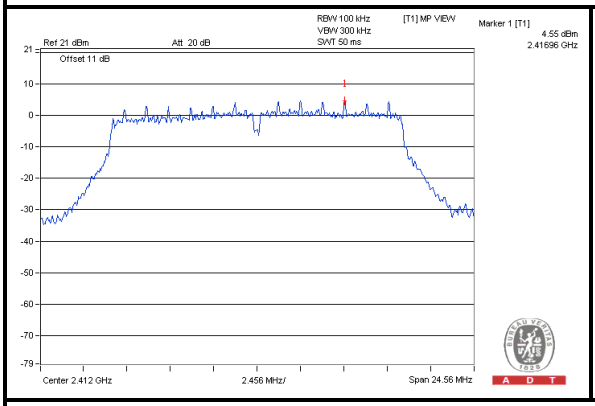
CH 11 Band edge

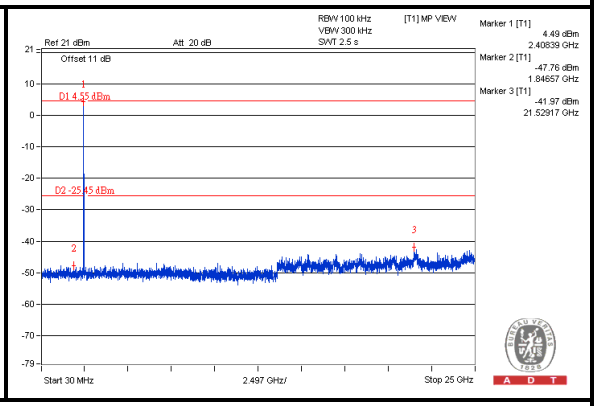


802.11g

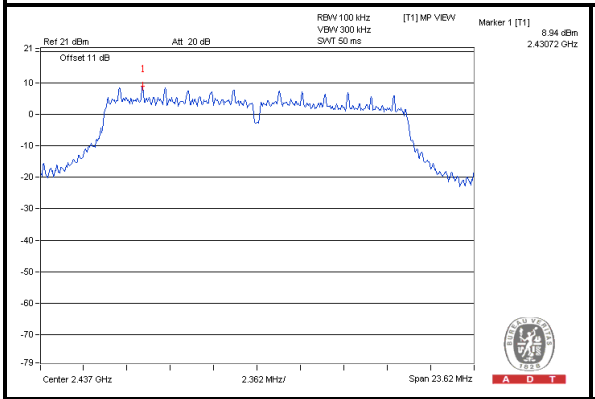
Chain(1)

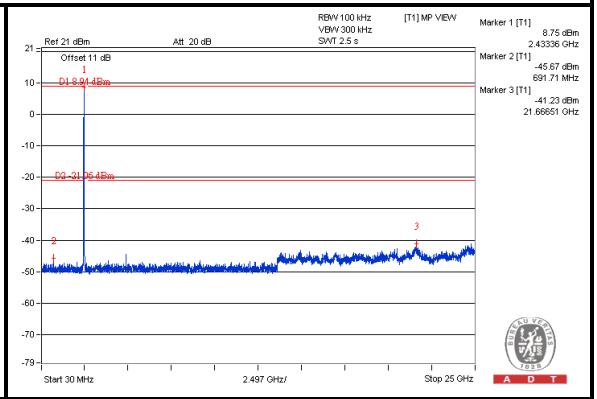
CH 1



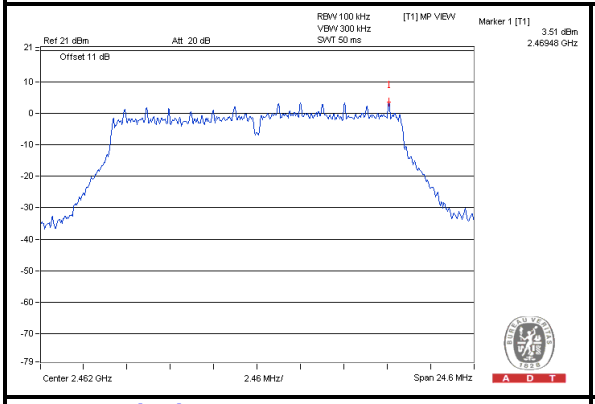


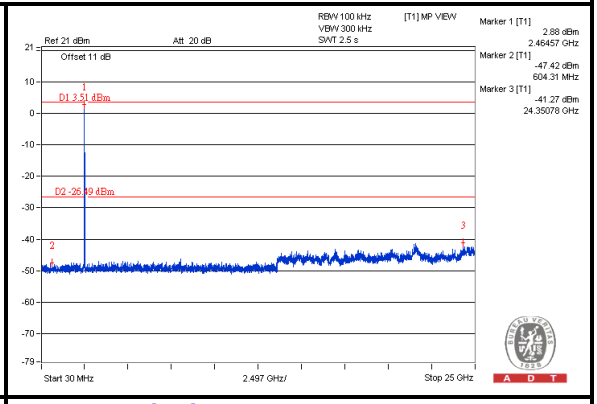
CH 6



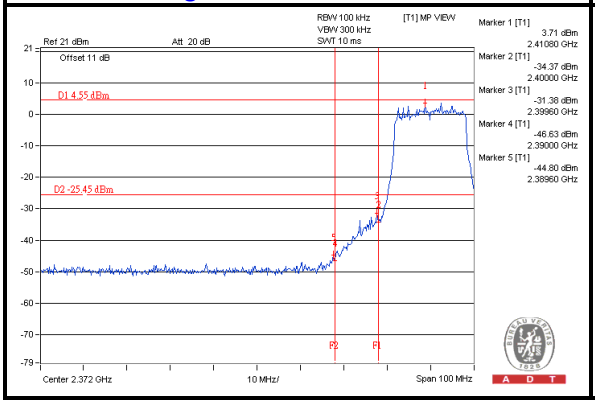


CH 11

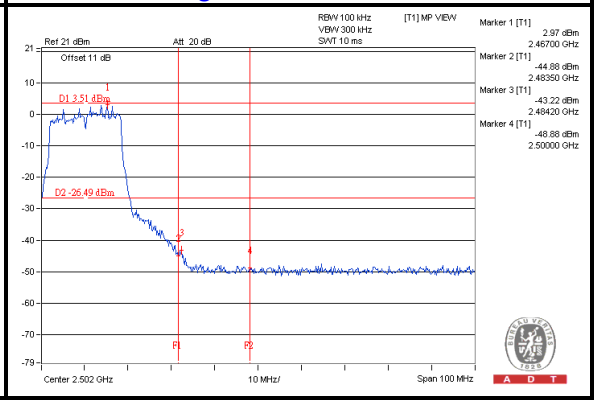




CH 1 Band edge



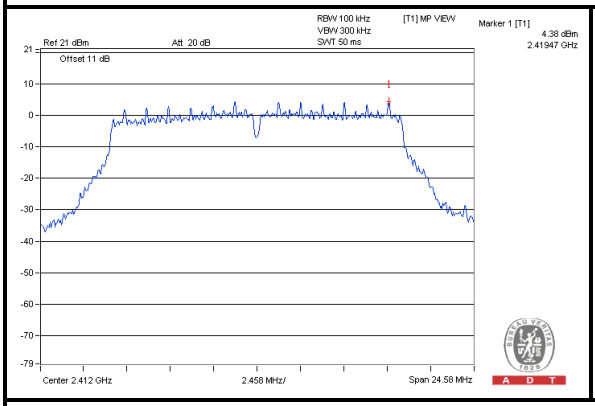
CH 11 Band edge

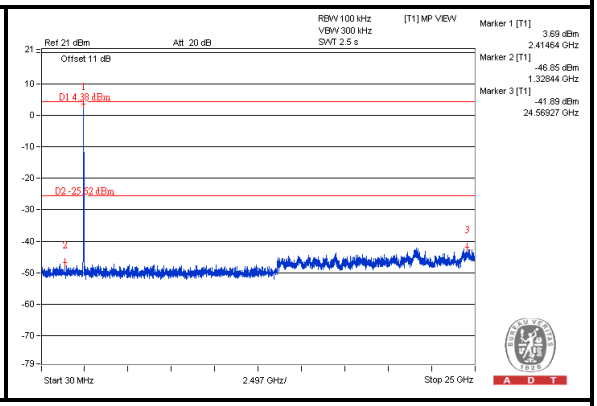


802.11g

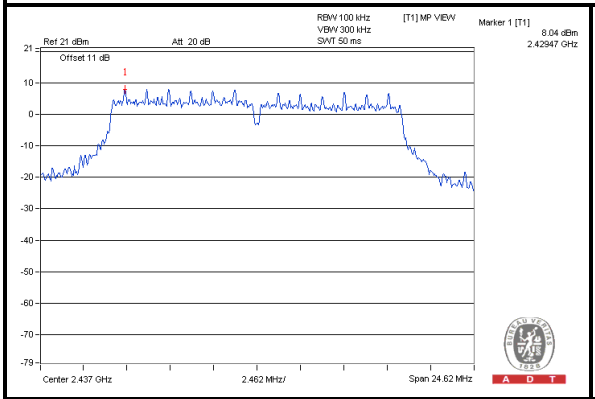
Chain(2)

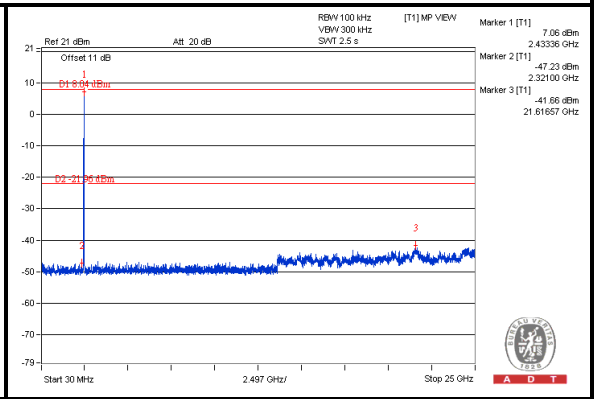
CH 1



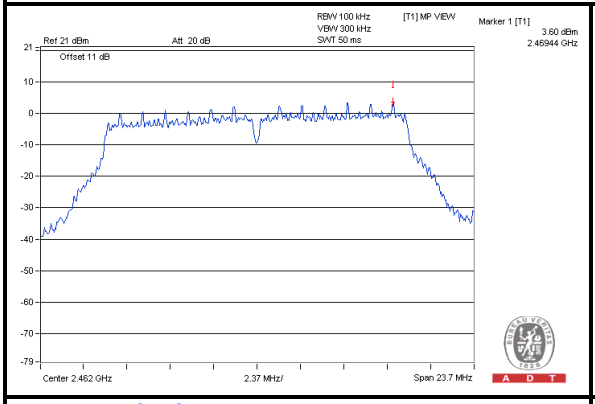


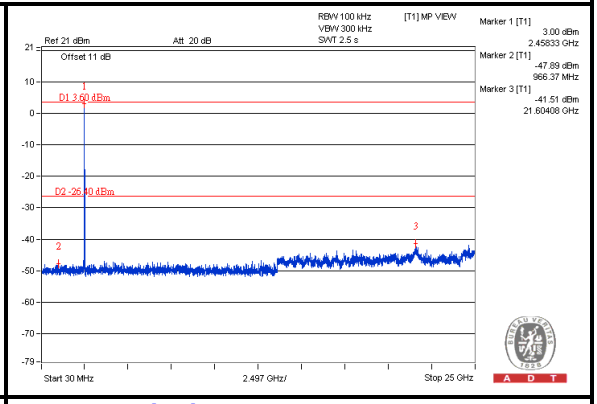
CH 6



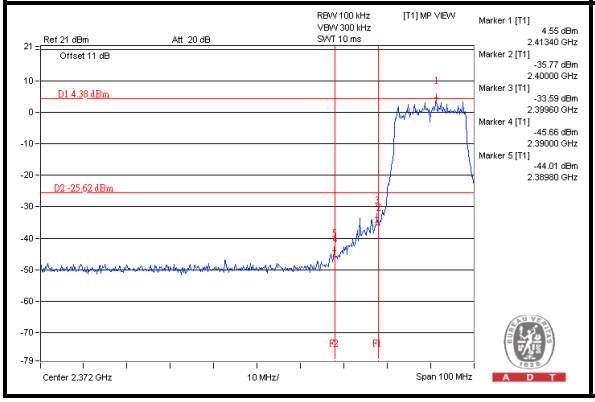


CH 11

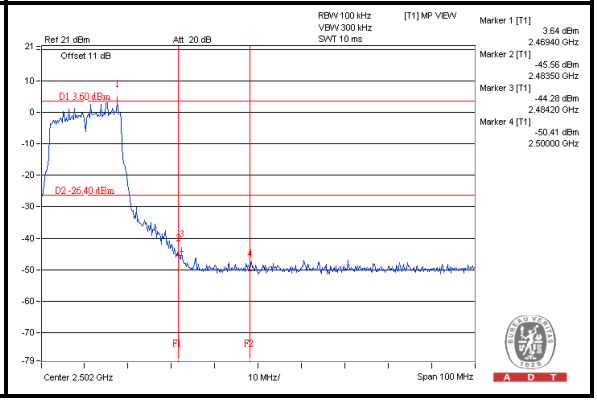




CH 1 Band edge



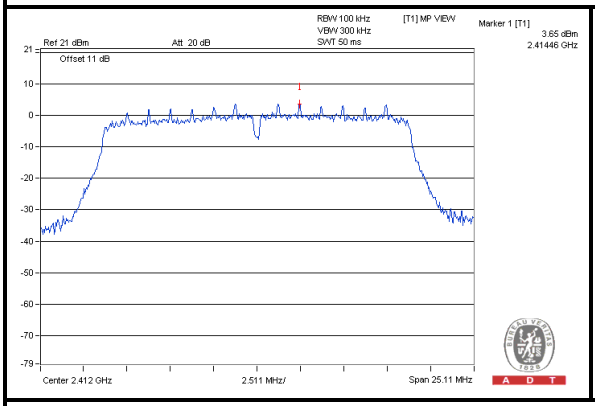
CH 11 Band edge

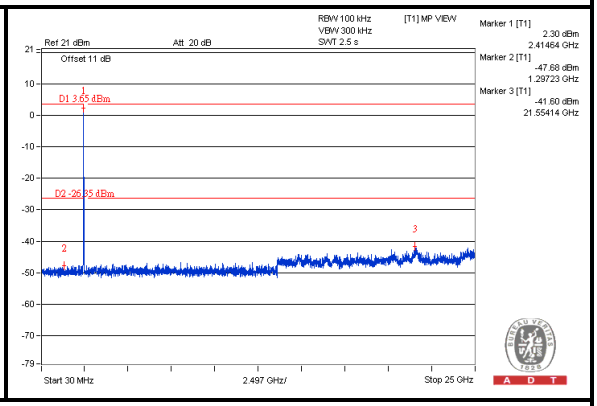


802.11n (HT20)

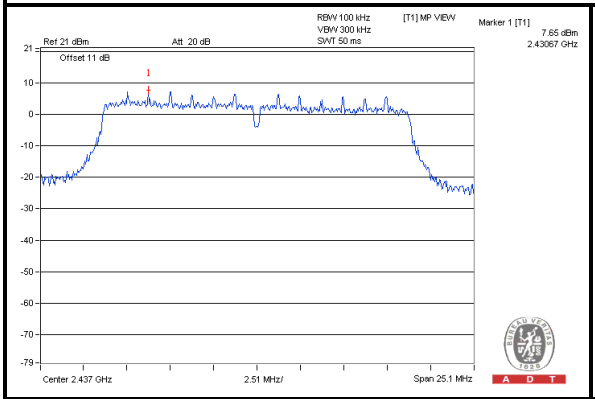
Chain(0)

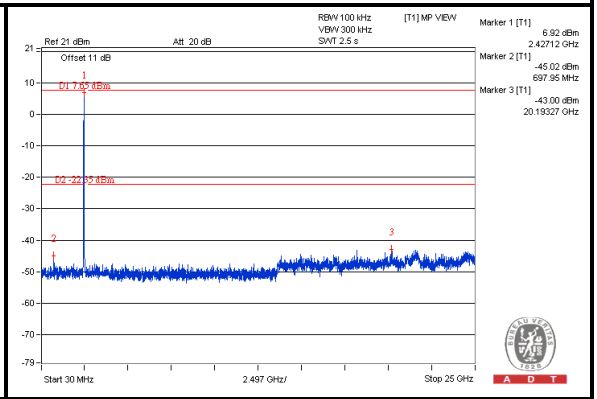
CH 1



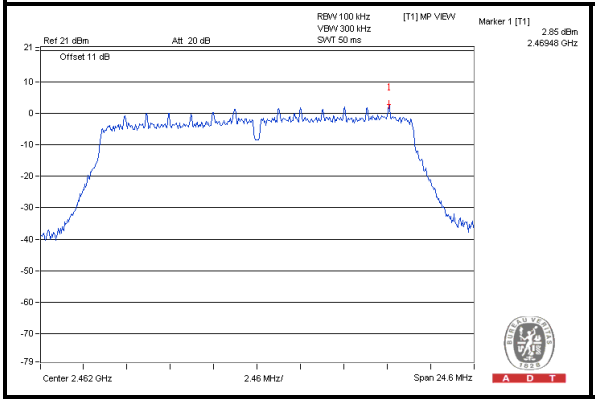


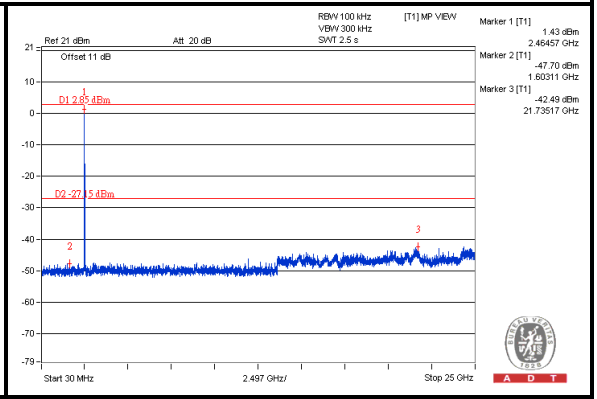
CH 6



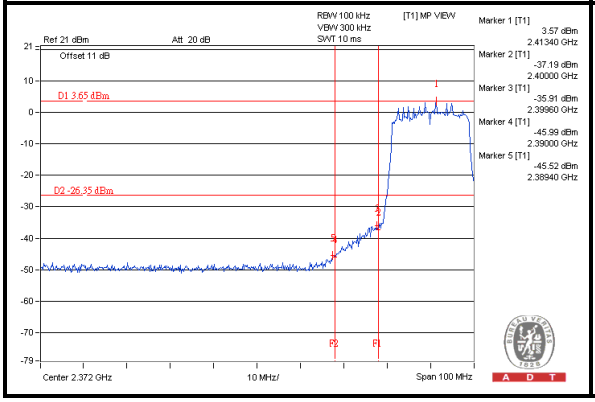


CH 11

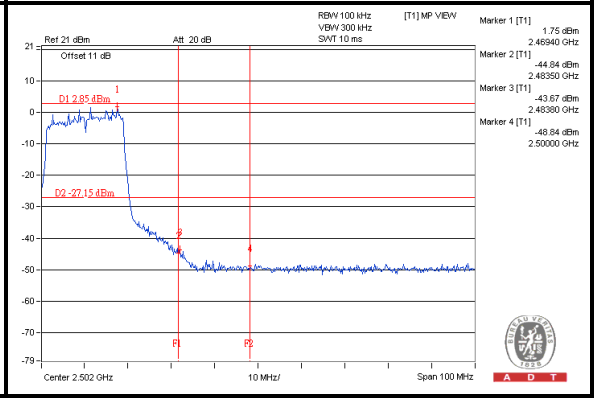




CH 1 Band edge



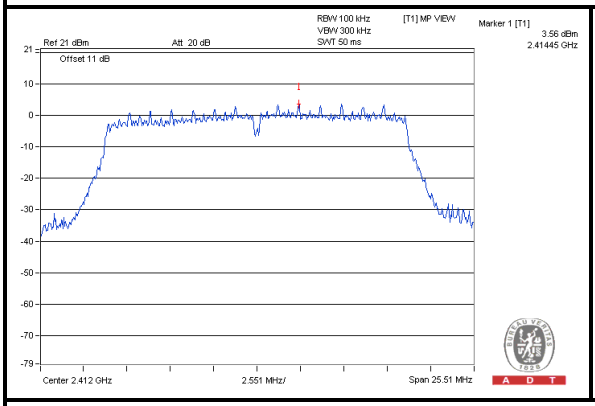
CH 11 Band edge

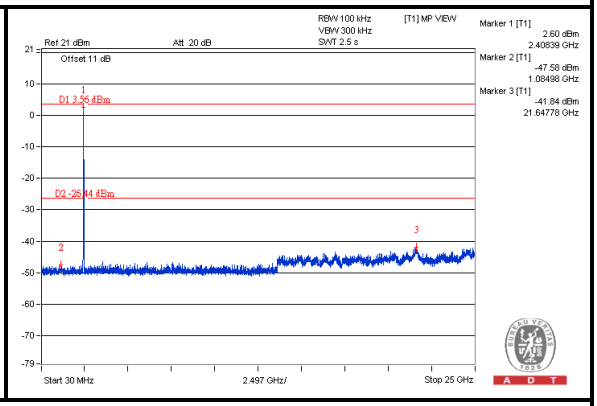


802.11n (HT20)

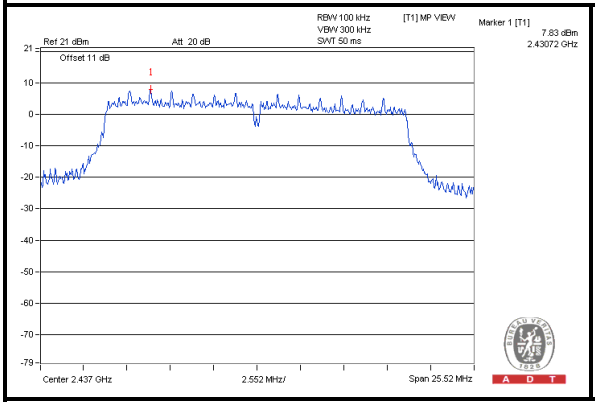
Chain(1)

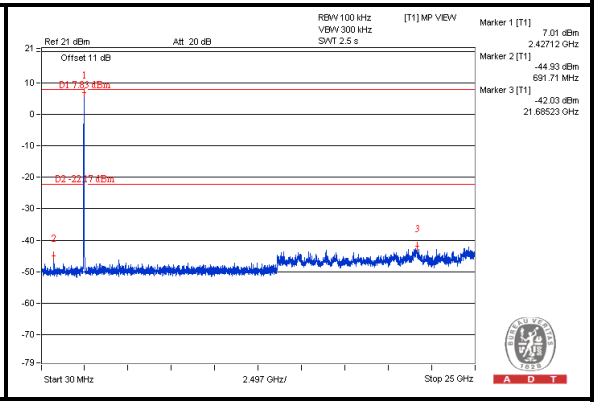
CH 1



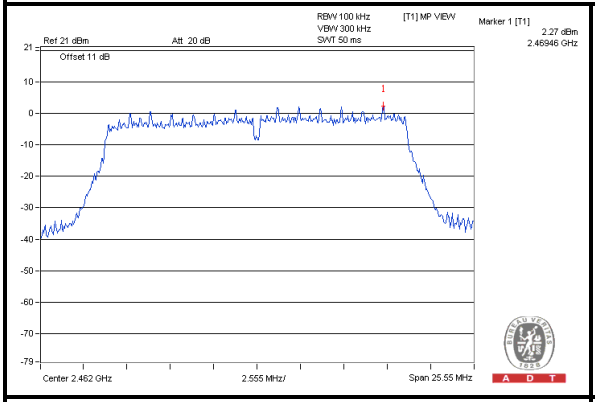


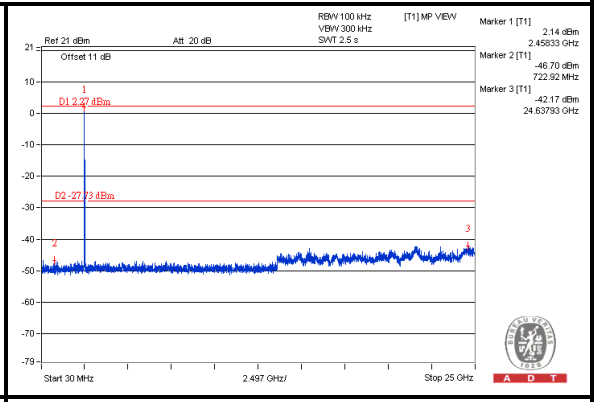
CH 6



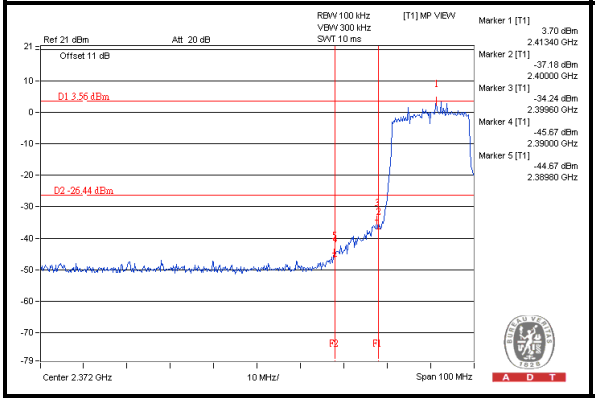


CH 11

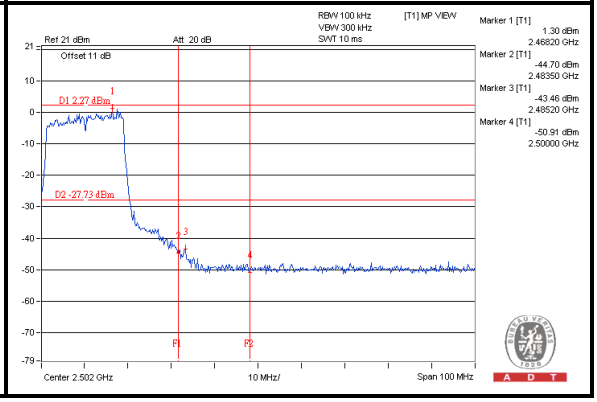




CH 1 Band edge



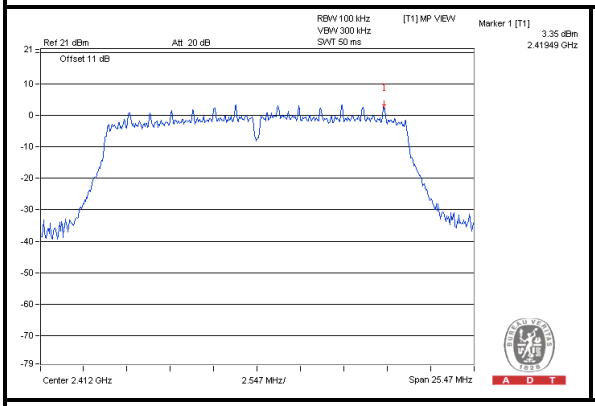
CH 11 Band edge

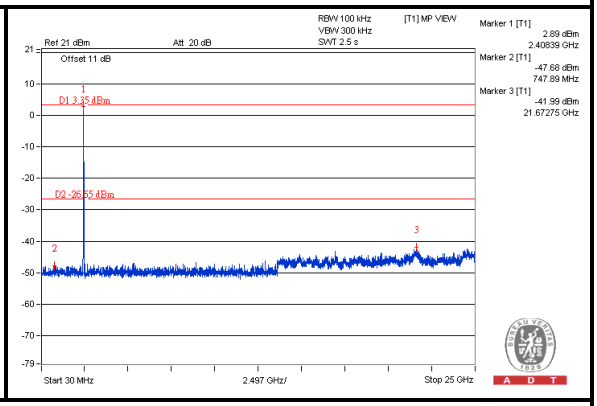


802.11n (HT20)

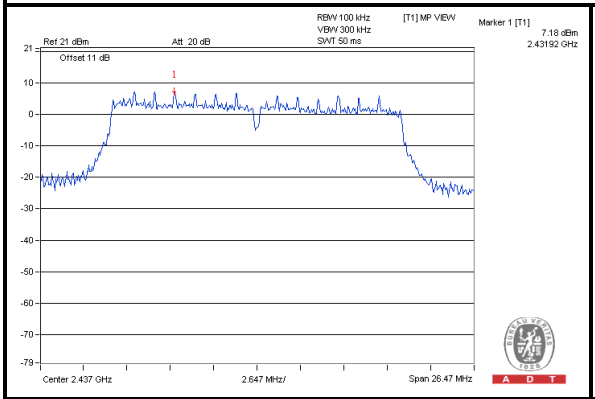
Chain(2)

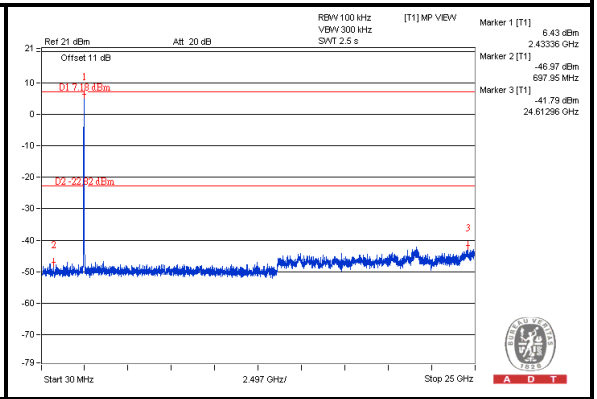
CH 1



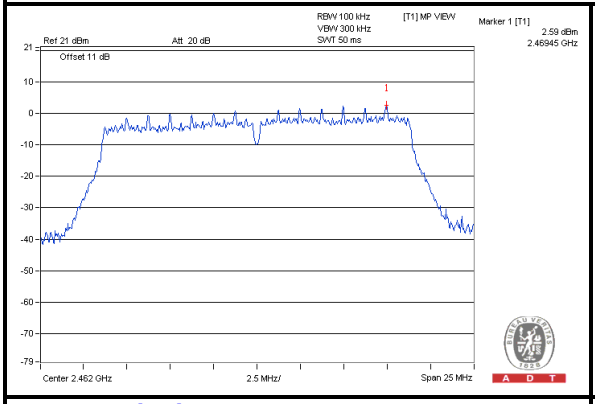


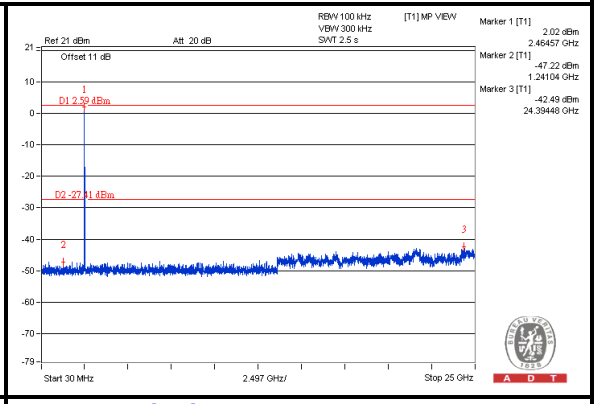
CH 6



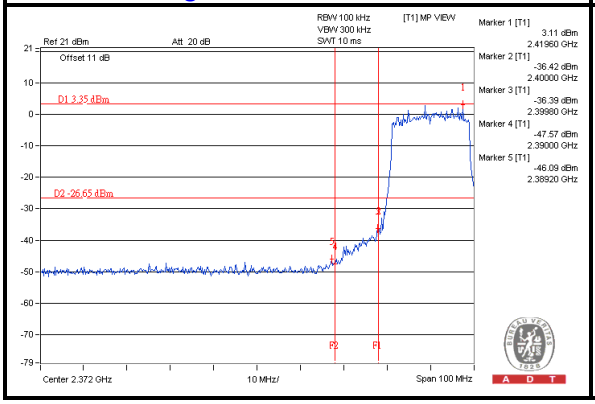


CH 11

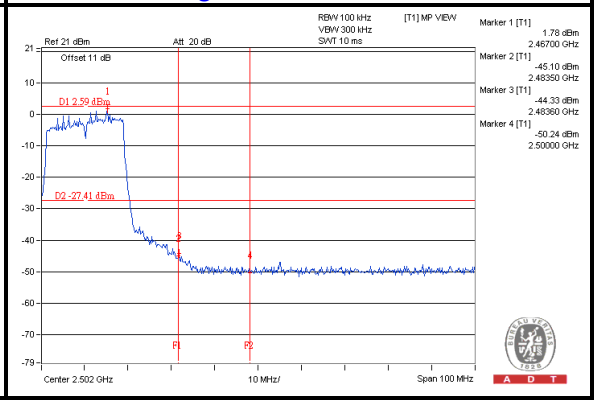




CH 1 Band edge



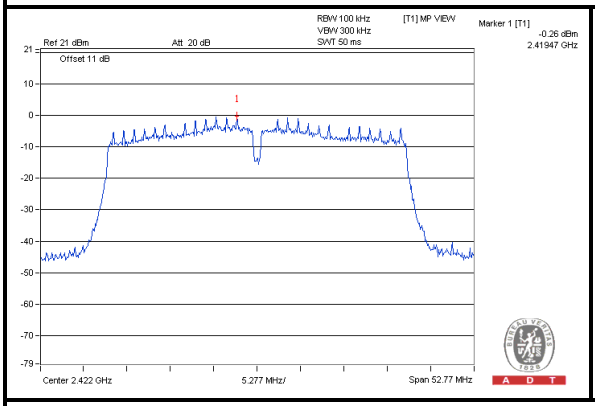
CH 11 Band edge

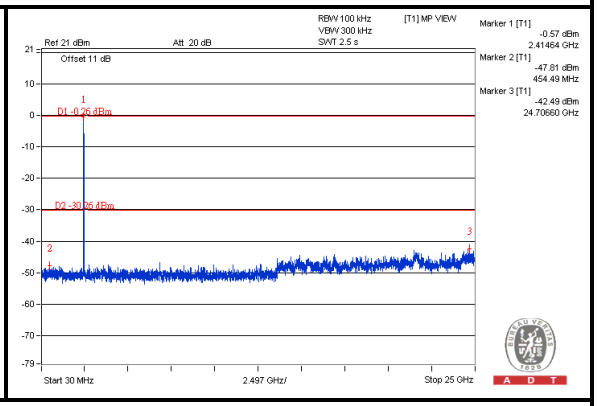


802.11n (HT40)

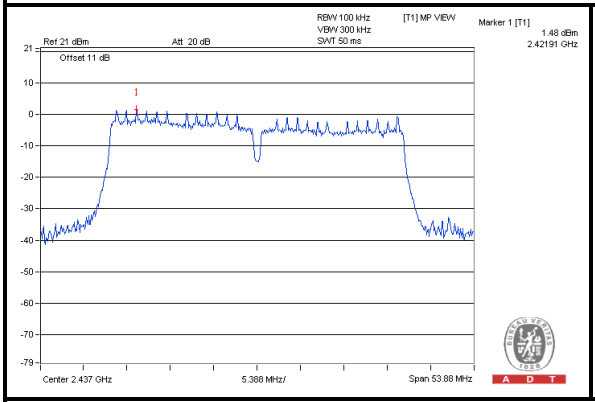
Chain(0)

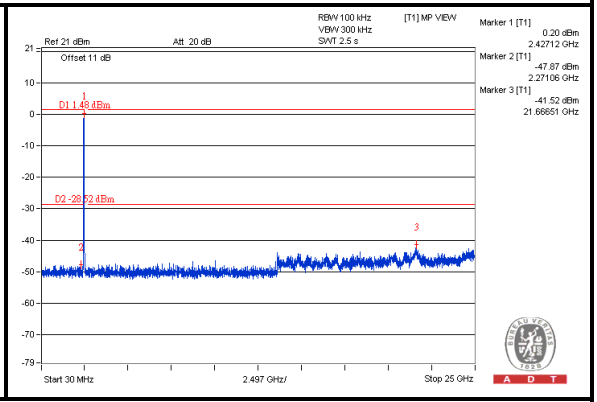
CH 3



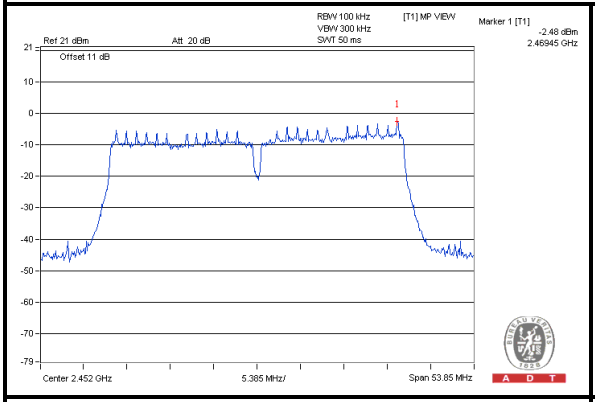


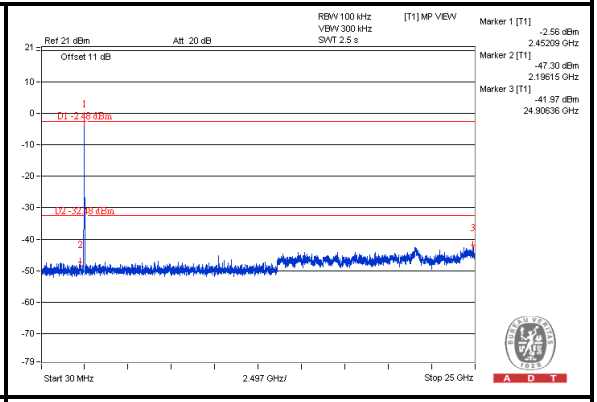
CH 6



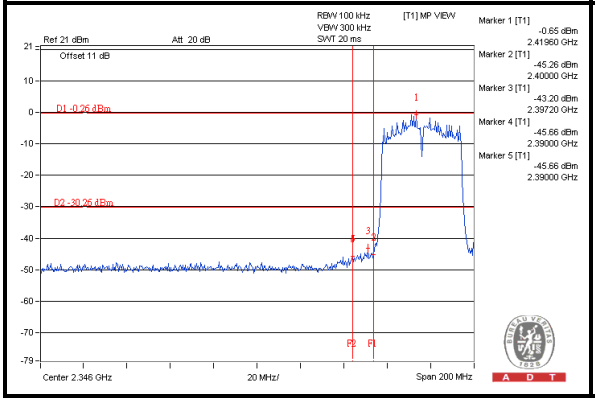


CH 9

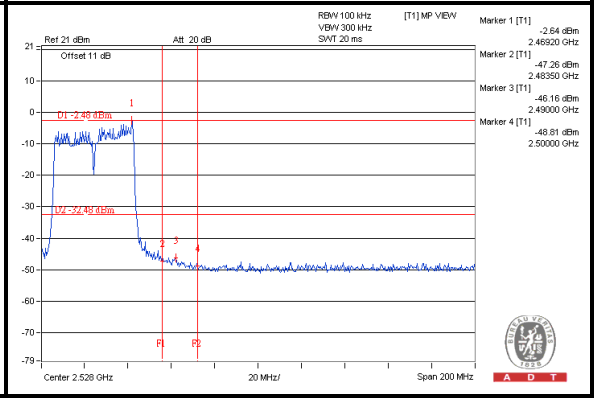




CH 1 Band edge



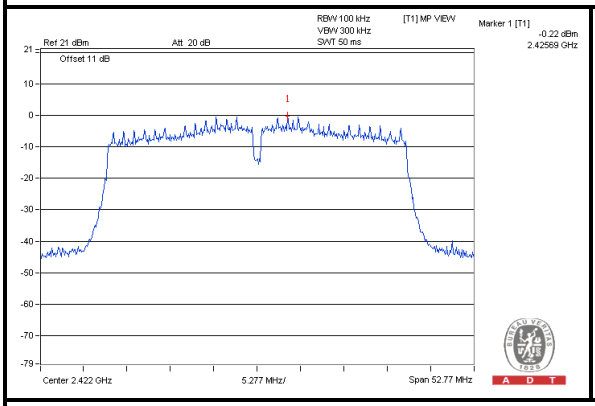
CH 11 Band edge

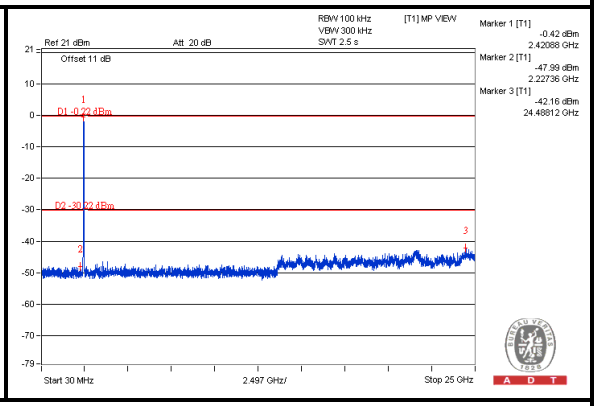


802.11n (HT40)

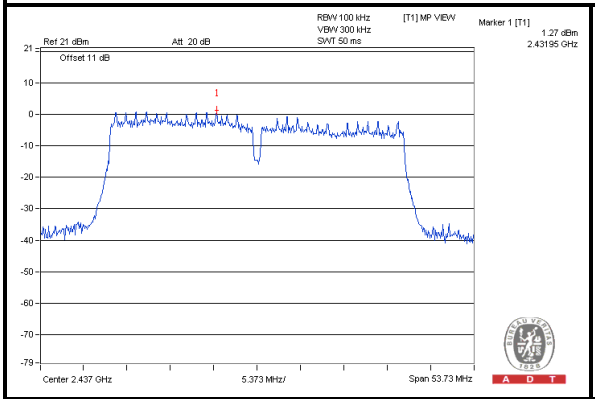
Chain(1)

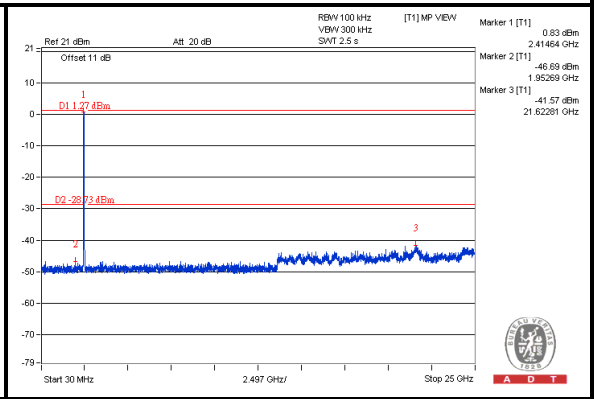
CH 3



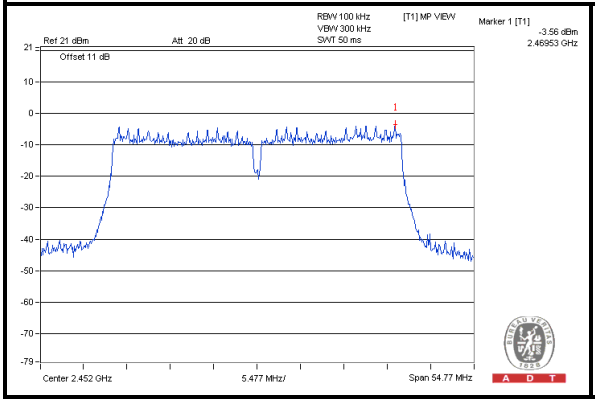


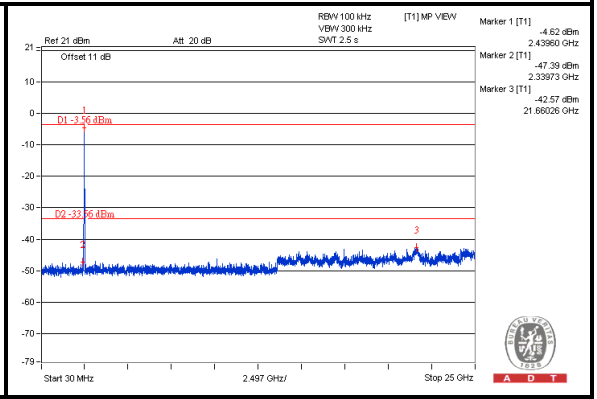
CH 6



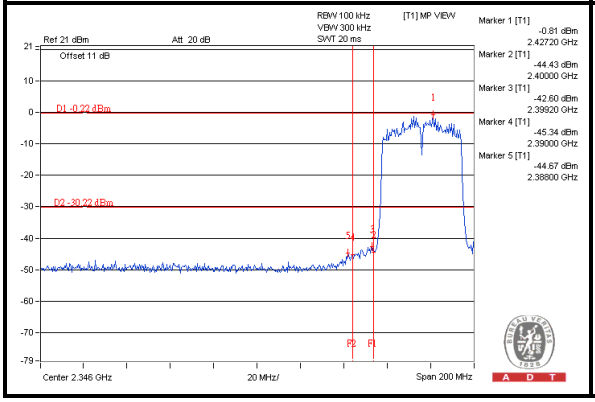


CH 9

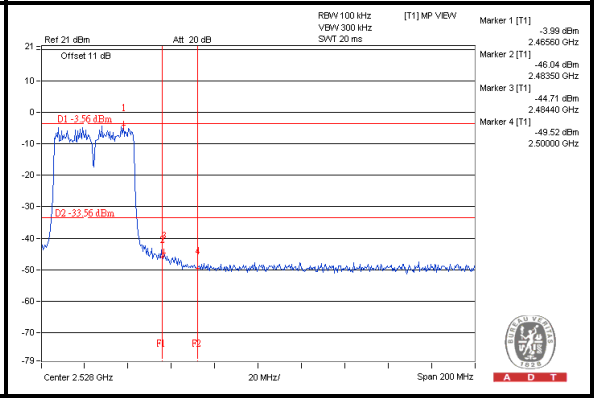




CH 1 Band edge



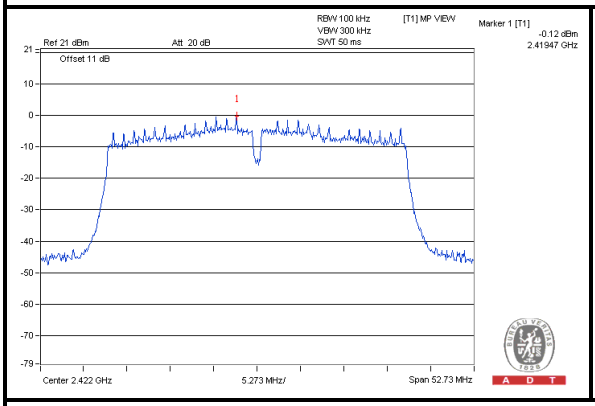
CH 11 Band edge

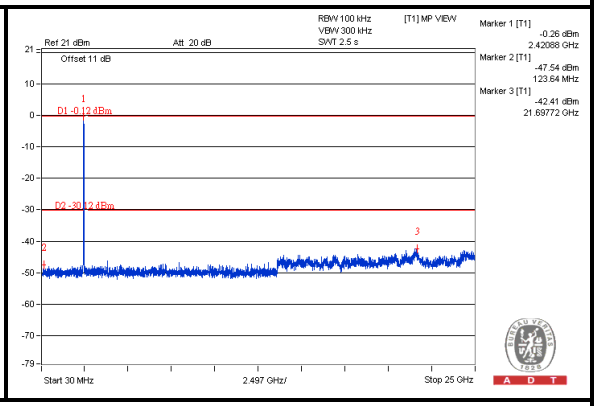


802.11n (HT40)

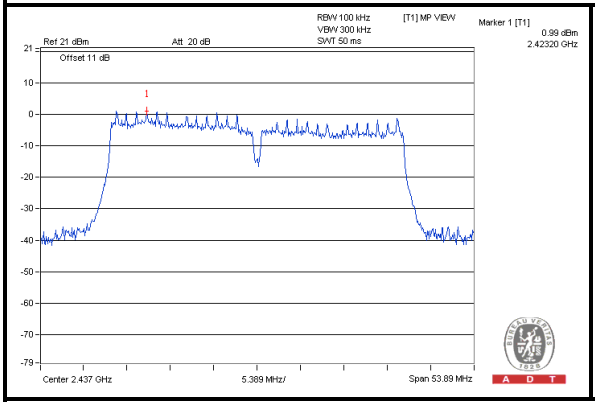
Chain(2)

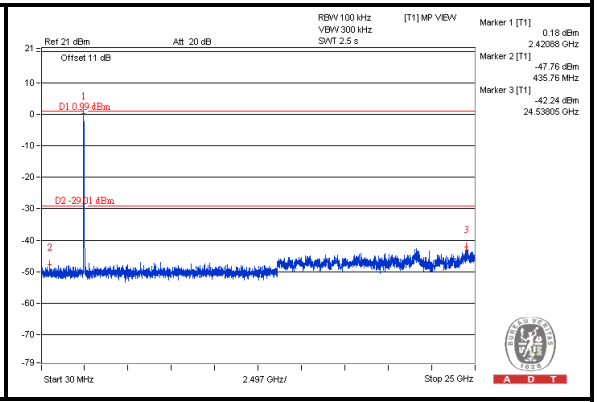
CH 3



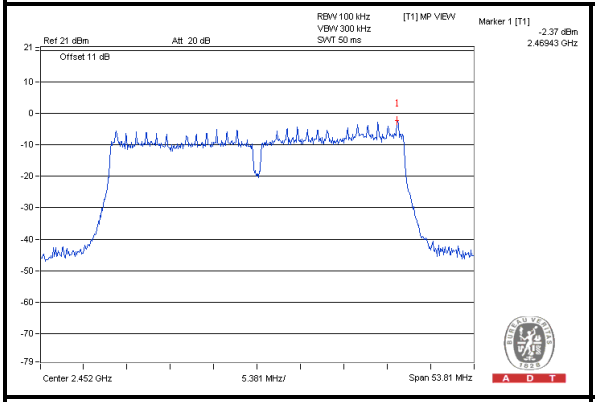


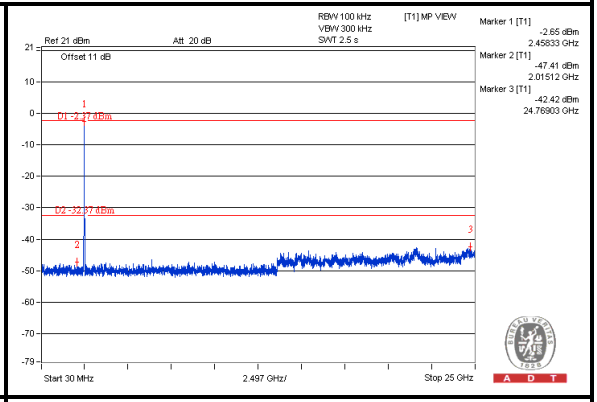
CH 6



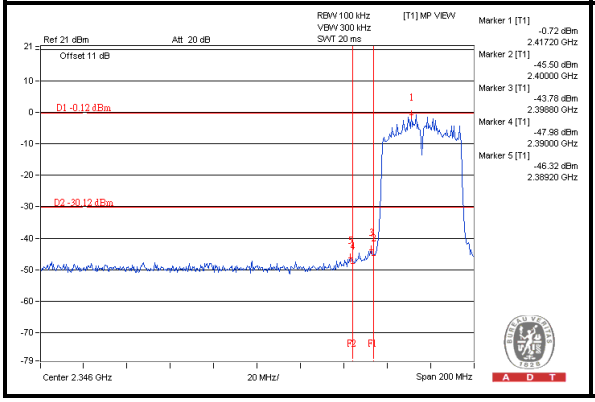


CH 9

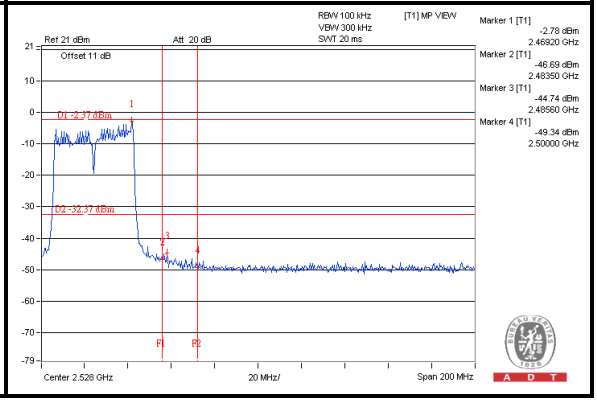




CH 1 Band edge



CH 11 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

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

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

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF/Telecom Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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.

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