



# FCC TEST REPORT (15.247)

**REPORT NO.:** RF121227E01B

**MODEL NO.:** WVBR0-01, WVBR0-25

**FCC ID:** NKR-DTVDWVB

**RECEIVED:** Dec. 27, 2012

**TESTED:** Jan. 04 to 09, 2013

**ISSUED:** Feb. 05, 2013

**APPLICANT:** Wistron NeWeb Corp.

**ADDRESS:** 20 Park Avenue II, Hsinchu Science Park, Hsinchu  
308, Taiwan, R.O.C.

**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.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification



A D T

## Table of Contents

RELEASE CONTROL RECORD.....	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS.....	6
2.1 MEASUREMENT UNCERTAINTY .....	7
3. GENERAL INFORMATION .....	8
3.1 GENERAL DESCRIPTION OF EUT.....	8
3.2 DESCRIPTION OF TEST MODES.....	10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	11
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	14
3.4 DESCRIPTION OF SUPPORT UNITS.....	15
3.5 CONFIGURATION OF SYSTEM UNDER TEST .....	16
4. TEST TYPES AND RESULTS (For 5Ghz, 5725~5850MHz Band).....	17
4.1 CONDUCTED EMISSION MEASUREMENT .....	17
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	17
4.1.2 TEST INSTRUMENTS .....	17
4.1.3 TEST PROCEDURES.....	18
4.1.4 DEVIATION FROM TEST STANDARD .....	18
4.1.5 TEST SETUP .....	18
4.1.6 EUT OPERATING CONDITIONS.....	19
4.1.7 TEST RESULTS.....	20
4.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT.....	22
4.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION MEASUREMENT ...	22
4.2.2 TEST INSTRUMENTS .....	23
4.2.3 TEST PROCEDURES.....	24
4.2.4 DEVIATION FROM TEST STANDARD .....	24
4.2.5 TEST SETUP .....	25
4.2.6 EUT OPERATING CONDITIONS.....	25
4.2.7 TEST RESULTS.....	26
4.3 6dB BANDWIDTH MEASUREMENT .....	35
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	35
4.3.2 TEST INSTRUMENTS .....	35
4.3.3 TEST PROCEDURE .....	35
4.3.4 DEVIATION FROM TEST STANDARD .....	35
4.3.5 TEST SETUP .....	35
4.3.6 EUT OPERATING CONDITIONS.....	35
4.3.7 TEST RESULTS.....	36
4.4 CONDUCTED OUTPUT POWER MEASUREMENT .....	37



A D T

4.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT .....	37
4.4.2	INSTRUMENTS .....	37
4.4.3	TEST PROCEDURES.....	37
4.4.4	DEVIATION FROM TEST STANDARD .....	37
4.4.5	TEST SETUP .....	37
4.4.6	EUT OPERATING CONDITIONS.....	37
4.4.7	TEST RESULTS.....	38
4.5	POWER SPECTRAL DENSITY MEASUREMENT.....	39
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	39
4.5.2	TEST INSTRUMENTS .....	39
4.5.3	TEST PROCEDURE .....	39
4.5.4	DEVIATION FROM TEST STANDARD .....	39
4.5.5	TEST SETUP .....	39
4.5.6	EUT OPERATING CONDITION .....	39
4.5.7	EST RESULTS .....	40
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	42
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT .....	42
4.6.2	TEST INSTRUMENTS .....	42
4.6.3	TEST PROCEDURE .....	42
4.6.4	DEVIATION FROM TEST STANDARD .....	43
4.6.5	TEST SETUP .....	43
4.6.6	EUT OPERATING CONDITION .....	43
4.6.7	TEST RESULTS.....	43
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	56
6.	INFORMATION ON THE TESTING LABORATORIES .....	57
7.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	58



A D T

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121227E01B	Original release	Feb. 05, 2013



A D T

## 1. CERTIFICATION

**PRODUCT:** Wireless Video Bridge  
**BRAND NAME:** DIRECTV  
**MODEL NO.:** WVBR0-01, WVBR0-25  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** Wistron NeWeb Corp.  
**TESTED:** Jan. 04 to 09, 2013  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10-2009

The above equipment (Model: WVBR0-01) 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:** Feb. 05, 2013  
( Midoli Peng, Specialist )

**APPROVED BY :**  , **DATE:** Feb. 05, 2013  
(May Chen, Deputy Manager )

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5725~5850MHz Band

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 -13.65dB at 0.16562MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.0dB at 11570.00MHz.
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	Antenna connector is i-pex not a standard connector.

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



A D T

## 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) - Chamber H	5.69 dB
Radiated emissions (1GHz -6GHz) - Chamber H	3.84 dB
Radiated emissions (6GHz -18GHz) - Chamber H	4.09 dB
Radiated emissions (18GHz -40GHz) - Chamber H	4.24 dB



A D T

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Wireless Video Bridge
<b>MODEL NO.</b>	WVBR0-01, WVBR0-25
<b>POWER SUPPLY</b>	DC 12V from power adapter
<b>MODULATION TYPE</b>	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	DSSS, OFDM
<b>TRANSFER RATE</b>	802.11a: up to 54Mbps 802.11n: up to 600Mbps
<b>OPERATING FREQUENCY</b>	<b>For 15.407</b> : 5.18 ~ 5.24GHz <b>For 15.247</b> : 5.745 ~ 5.825GHz
<b>NUMBER OF CHANNEL</b>	<b>For 15.407</b> 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) <b>For 15.247(5GHz)</b> 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
<b>MAXIMUM OUTPUT POWER</b>	<b>For 15.407</b> 802.11a: 36.519mW 802.11n (HT20): 44.494mW 802.11n (HT40): 41.658mW <b>For 15.247 (5GHz)</b> 802.11a: 434.490mW 802.11n (HT20): 441.737mW 802.11n (HT40): 407.914mW
<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	Refer to user's manual
<b>ASSOCIATED DEVICES</b>	Adapter x 1



**NOTE:**

1. The EUT has two model names which are identical to each other in all aspects except for the following table:

Brand	Model Name	Description
DIRECTV	WVBR0-01	For marketing requirement
	WVBR0-25	

From the above models, model: **WVBR0-01** was selected as representative model for the test and its data was recorded in this report.

2. The EUT must be supplied with a power adapter as below table:

Brand	Model No.	Spec.
DIRECTV	ES10R1-16	AC Input: 120 V, 60Hz, 0.5A AC output cable (Shielded, 0.9m) DC Output: 12V, 1.5A DC output cable (Unshielded, 1.8m)

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

Transmitter Circuit	Antenna Type	Gain (dBi)	Frequency range (MHz to MHz)	Connector type
Chain (0)	Dipole	4.77	5150 ~ 5250	i-pex
		4.46	5250 ~ 5350	
		5.19	5470 ~ 5725	
		5.07	5745 ~ 5825	
Chain (1)	Dipole	4.11	5150 ~ 5250	i-pex
		3.46	5250 ~ 5350	
		3.96	5470 ~ 5725	
		4.09	5745 ~ 5825	
Chain (2)	Dipole	4.86	5150 ~ 5250	i-pex
		5.14	5250 ~ 5350	
		4.83	5470 ~ 5725	
		4.50	5745 ~ 5825	
Chain (3)	Dipole	5.12	5150 ~ 5250	i-pex
		5.01	5250 ~ 5350	
		4.57	5470 ~ 5725	
		4.65	5745 ~ 5825	

4. The EUT incorporates a MIMO function without beam forming.

MODULATION MODE	TX/RX FUNCTION
802.11a	4TX/4RX
802.11n (HT20)	4TX/4RX
802.11n (HT40)	4TX/4RX

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 31.

6. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

#### Operated in 5725 ~ 5850MHz band:

5 channels are provided for 802.11a, 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz





**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)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	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)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	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)
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	13.5



A D T

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 52%RH	120Vac, 60Hz	Timmy Hu
RE<1G	23deg. C, 71%RH	120Vac, 60Hz	Robert Cheng
RE <sup>3</sup> 1G	26deg. C, 75%RH	120Vac, 60Hz	Robert Cheng
	20deg. C, 64%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
	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**

**662911 D01 Multiple Transmitter Output**

**ANSI C63.10-2009**

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B. The test report has been issued separately.



A D T

### 3.4 DESCRIPTION OF SUPPORT UNITS

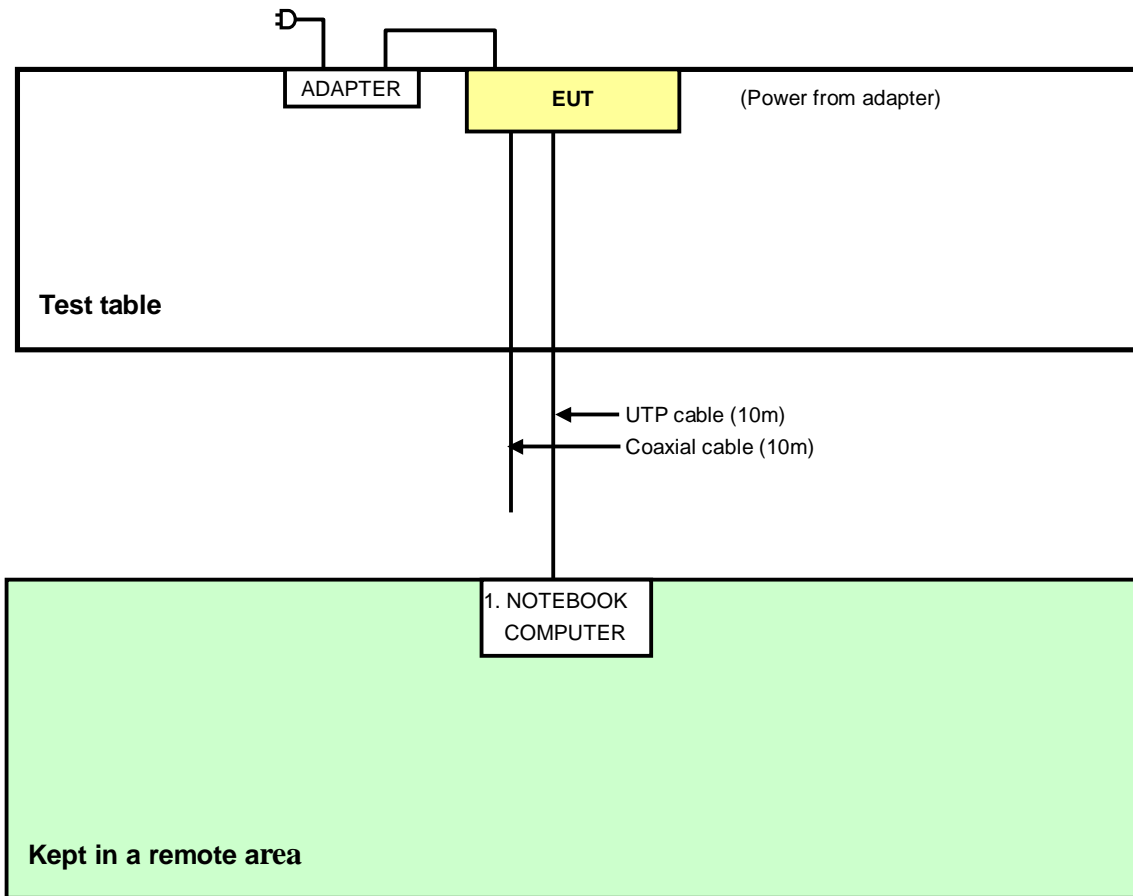
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable, 10m

Note: The power cords of the above support units were unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST







A D T

## 4. TEST TYPES AND RESULTS (FOR 5GHz, 5725~5850MHz Band)

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.  
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK 8127	8127-523	Sep. 19, 2012	Sep. 20, 2013
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	848773/004	Oct. 29, 2012	Oct. 28, 2013
RF Cable (JYEBAO)	5DFB	COACAB-002	Aug. 05, 2012	Aug. 04, 2013
50 ohms Terminator	50	3	Oct. 23, 2012	Oct. 22, 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: Jan. 04, 2013

#### 4.1.3 TEST PROCEDURES

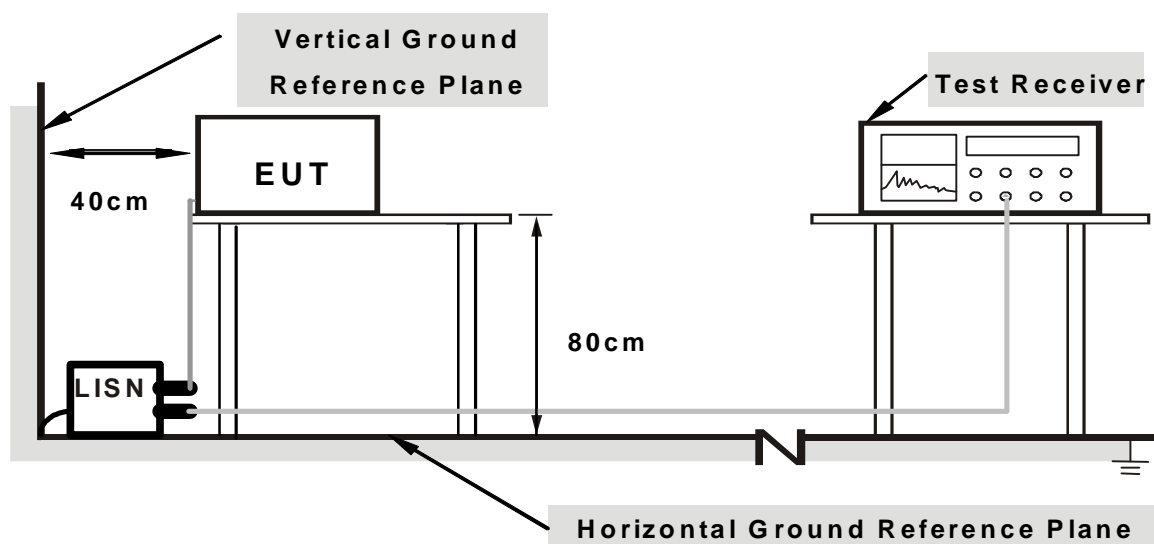
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
- b. The two LISNs provide 50 ohm/ 50uH of coupling 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:** 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 “Telnet 192.168.1.100” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

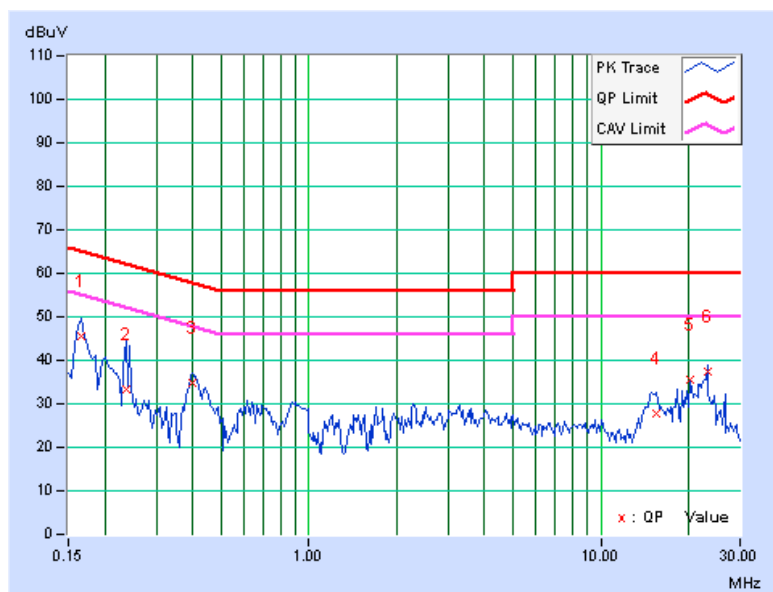
### 4.1.7 TEST RESULTS

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

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	0.16562	0.10	45.36	41.43	45.46	41.53	65.18
2	0.23594	0.12	33.07	21.83	33.19	21.95	62.24	52.24	-29.05	-30.29
3	0.40000	0.16	34.74	29.86	34.90	30.02	57.85	47.85	-22.95	-17.83
4	15.57422	0.81	26.98	20.71	27.79	21.52	60.00	50.00	-32.21	-28.48
5	20.25781	0.98	34.64	32.22	35.62	33.20	60.00	50.00	-24.38	-16.80
6	23.12891	1.12	36.37	33.11	37.49	34.23	60.00	50.00	-22.51	-15.77

#### 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.

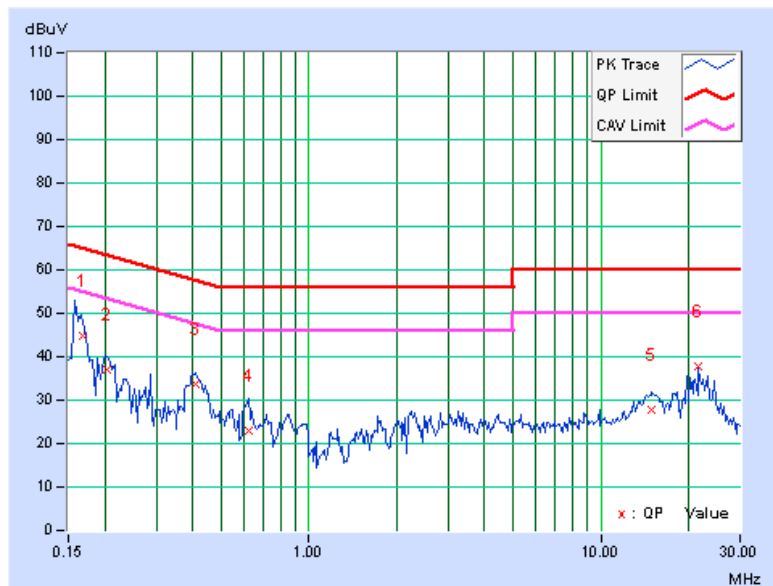


<b>PHASE</b>	Neutral (N)	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

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	0.16769	0.15	44.63	39.29	44.78	39.44	65.07	55.07	-20.30	-15.64
2	0.20469	0.15	37.01	28.04	37.16	28.19	63.42	53.42	-26.26	-25.23
3	0.41172	0.19	33.40	27.26	33.59	27.45	57.61	47.61	-24.02	-20.16
4	0.61875	0.20	22.93	16.41	23.13	16.61	56.00	46.00	-32.87	-29.39
5	14.91797	0.67	27.03	21.89	27.70	22.56	60.00	50.00	-32.30	-27.44
6	21.66406	0.82	36.97	34.87	37.79	35.69	60.00	50.00	-22.21	-14.31

**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 AND BANDEDGE EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION 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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
Pre-Selector Agilent	N9039A	MY46520310	Sep. 03, 2012	Sep. 02, 2013
Signal Generator Agilent	N5181A	MY49060347	July 24, 2012	July 23, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Software	ADT_Radiated _V8.7.05	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: Jan. 07 to 09, 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 a 3 meters chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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:**

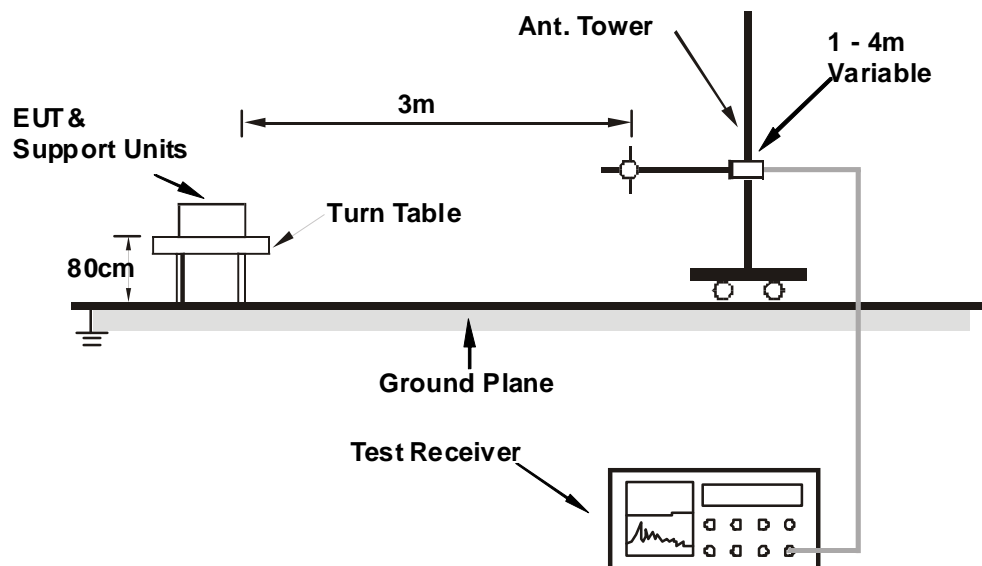
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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. 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



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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

#### 802.11n (HT20)

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	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	109.70	33.5 QP	43.5	-10.0	1.50 H	267	22.56	10.97
2	250.03	27.0 QP	46.0	-19.1	1.25 H	67	13.65	13.30
3	475.03	29.0 QP	46.0	-17.0	1.50 H	259	9.55	19.49
4	700.04	29.3 QP	46.0	-16.7	1.00 H	19	5.61	23.71
5	824.97	31.3 QP	46.0	-14.7	1.00 H	238	5.28	26.02
6	925.04	33.6 QP	46.0	-12.4	1.25 H	251	6.04	27.54

#### 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	58.66	36.4 QP	40.0	-3.6	1.00 V	24	22.87	13.57
2	108.75	30.4 QP	43.5	-13.1	1.75 V	0	19.56	10.85
3	230.96	26.5 QP	46.0	-19.5	1.00 V	360	14.09	12.44
4	382.31	29.4 QP	46.0	-16.6	1.00 V	33	12.05	17.33
5	824.97	33.9 QP	46.0	-12.1	1.25 V	289	7.85	26.02
6	925.04	34.6 QP	46.0	-11.4	1.00 V	246	7.10	27.54

#### REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



A D T

**ABOVE 1GHz DATA**

**802.11a**

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5745.00	118.5 PK			1.00 H	72	75.02	43.48
2	*5745.00	109.2 AV			1.00 H	72	65.72	43.48
3	11490.00	57.6 PK	74.0	-16.4	1.00 H	248	7.42	50.18
4	11490.00	46.0 AV	54.0	-8.0	1.00 H	248	-4.18	50.18

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5745.00	118.9 PK			1.00 V	360	75.42	43.48
2	*5745.00	109.0 AV			1.00 V	360	65.52	43.48
3	11490.00	62.2 PK	74.0	-11.8	1.21 V	293	12.02	50.18
4	11490.00	51.6 AV	54.0	-2.4	1.21 V	293	1.42	50.18

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5785.00	118.6 PK			1.00 H	84	75.08	43.52
2	*5785.00	109.2 AV			1.00 H	84	65.68	43.52
3	11570.00	58.4 PK	74.0	-15.6	1.00 H	247	8.22	50.18
4	11570.00	46.4 AV	54.0	-7.6	1.00 H	247	-3.78	50.18

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	118.9 PK			1.04 V	360	75.38	43.52
2	*5785.00	109.0 AV			1.04 V	360	65.48	43.52
3	11570.00	62.6 PK	74.0	-11.4	1.19 V	300	12.42	50.18
4	11570.00	52.0 AV	54.0	-2.0	1.19 V	300	1.82	50.18

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5825.00	118.1 PK			1.00 H	80	74.49	43.61
2	*5825.00	108.7 AV			1.00 H	80	65.09	43.61
3	11650.00	58.3 PK	74.0	-15.7	1.00 H	249	7.88	50.42
4	11650.00	46.5 AV	54.0	-7.5	1.00 H	249	-3.92	50.42

**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	*5825.00	119.0 PK			1.06 V	360	75.39	43.61
2	*5825.00	109.2 AV			1.06 V	360	65.59	43.61
3	11650.00	62.5 PK	74.0	-11.5	1.21 V	293	12.08	50.42
4	11650.00	51.9 AV	54.0	-2.1	1.21 V	293	1.48	50.42

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.

**802.11n (HT20)**

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
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	*5745.00	118.1 PK			1.00 H	85	74.62	43.48
2	*5745.00	108.9 AV			1.00 H	85	65.42	43.48
3	11490.00	57.3 PK	74.0	-16.7	1.00 H	227	7.12	50.18
4	11490.00	46.4 AV	54.0	-7.6	1.00 H	227	-3.78	50.18
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>								
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	*5745.00	118.3 PK			1.00 V	187	74.82	43.48
2	*5745.00	108.7 AV			1.00 V	187	65.22	43.48
3	11490.00	62.5 PK	74.0	-11.5	1.26 V	307	12.32	50.18
4	11490.00	51.6 AV	54.0	-2.4	1.26 V	307	1.42	50.18

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5785.00	119.1 PK			1.11 H	81	75.58	43.52
2	*5785.00	108.8 AV			1.11 H	81	65.28	43.52
3	11570.00	58.7 PK	74.0	-15.3	1.00 H	252	8.52	50.18
4	11570.00	46.0 AV	54.0	-8.0	1.00 H	252	-4.18	50.18

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	117.3 PK			1.00 V	192	73.78	43.52
2	*5785.00	107.0 AV			1.00 V	192	63.48	43.52
3	11570.00	61.9 PK	74.0	-12.1	1.21 V	310	11.72	50.18
4	11570.00	51.2 AV	54.0	-2.8	1.21 V	310	1.02	50.18

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5825.00	118.8 PK			1.00 H	79	75.19	43.61
2	*5825.00	109.2 AV			1.00 H	79	65.59	43.61
3	11650.00	58.1 PK	74.0	-15.9	1.00 H	231	7.68	50.42
4	11650.00	46.2 AV	54.0	-7.8	1.00 H	231	-4.22	50.42

**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	*5825.00	118.3 PK			1.06 V	186	74.69	43.61
2	*5825.00	107.8 AV			1.06 V	186	64.19	43.61
3	11650.00	61.7 PK	74.0	-12.3	1.24 V	295	11.28	50.42
4	11650.00	51.2 AV	54.0	-2.8	1.24 V	295	0.78	50.42

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.





A D T

802.11n (HT40)

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5755.00	114.4 PK			1.00 H	83	70.92	43.48
2	*5755.00	104.8 AV			1.00 H	83	61.32	43.48
3	11510.00	57.3 PK	74.0	-16.7	1.00 H	225	7.13	50.17
4	11510.00	45.7 AV	54.0	-8.3	1.00 H	225	-4.47	50.17

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	117.2 PK			1.03 V	182	73.72	43.48
2	*5755.00	107.0 AV			1.03 V	182	63.52	43.48
3	11510.00	61.3 PK	74.0	-12.7	1.18 V	280	11.13	50.17
4	11510.00	50.9 AV	54.0	-3.1	1.18 V	280	0.73	50.17

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		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	*5795.00	114.5 PK			1.00 H	80	70.97	43.53
2	*5795.00	104.7 AV			1.00 H	80	61.17	43.53
3	11590.00	58.7 PK	74.0	-15.3	1.00 H	235	8.51	50.19
4	11590.00	46.2 AV	54.0	-7.8	1.00 H	235	-3.99	50.19

**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	*5795.00	117.0 PK			1.04 V	180	73.47	43.53
2	*5795.00	107.0 AV			1.04 V	180	63.47	43.53
3	11590.00	61.5 PK	74.0	-12.5	1.15 V	264	11.31	50.19
4	11590.00	51.1 AV	54.0	-2.9	1.15 V	264	0.91	50.19

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. The limit value is defined as per 15.247.

### 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 : Jan. 09, 2013

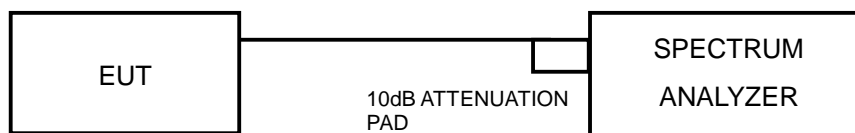
#### 4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
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.



A D T

#### 4.3.7 TEST RESULTS

##### 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
149	5745	16.40	16.36	16.42	16.39	0.5	PASS
157	5785	15.76	16.39	16.38	16.38	0.5	PASS
165	5825	16.10	16.39	16.37	16.39	0.5	PASS

##### 802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
149	5745	17.68	17.66	17.68	17.69	0.5	PASS
157	5785	17.60	17.64	17.66	17.68	0.5	PASS
165	5825	17.35	17.65	17.66	17.68	0.5	PASS

##### 802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
151	5755	36.13	35.89	36.14	36.17	0.5	PASS
159	5795	35.95	35.78	35.56	36.33	0.5	PASS

## 4.4 CONDUCTED OUTPUT POWER MEASUREMENT

### 4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz band: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT  $\leq$  4;  
 Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq$  40 MHz for any NANT;  
 Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT  $\geq$  5.

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

### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 10, 2012	May 09, 2013
Power Sensor	MA2411B	0738172	May 10, 2012	May 09, 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 : Jan. 09, 2013

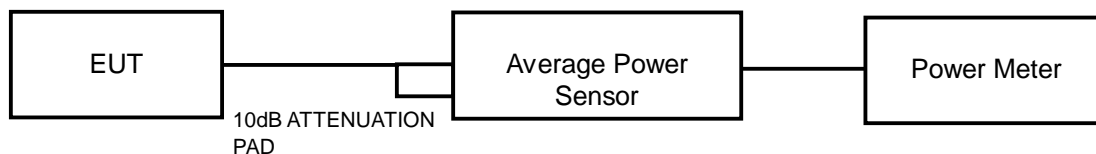
### 4.4.3 TEST PROCEDURES

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



A D T

#### 4.4.7 TEST RESULTS

##### 802.11a

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
149	5745	20.17	20.00	20.17	20.73	426.288	26.30	30	PASS
157	5785	20.05	20.16	20.31	20.87	434.490	26.38	30	PASS
165	5825	20.05	20.04	20.45	20.61	428.080	26.32	30	PASS

##### 802.11n (HT20)

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
149	5745	19.16	19.27	19.53	19.91	354.634	25.50	30	PASS
157	5785	19.87	19.87	20.34	20.58	416.533	26.20	30	PASS
165	5825	20.27	19.95	20.58	20.87	441.737	26.45	30	PASS

##### 802.11n (HT40)

CHAN.	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
151	5755	18.15	18.34	18.54	19.10	286.280	24.57	30	PASS
159	5795	19.73	20.15	20.14	20.30	407.914	26.11	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
R&S Spectrum Analyzer	FSP 40	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 : Jan. 09, 2013

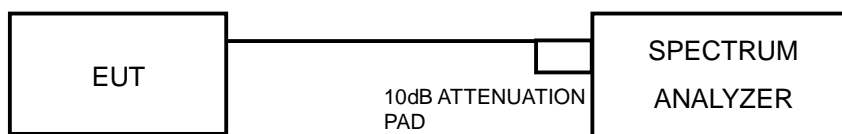
### 4.5.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = power averaging (RMS) .
2. Ensure that the number of measurement points in the sweep  $\geq 2 \times$  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



A D T

## 4.5.7 EST RESULTS

### 802.11a

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-5.75	6.02	0.27	8	PASS
	157	5785	-6.25	6.02	-0.23	8	PASS
	165	5825	-6.38	6.02	-0.36	8	PASS
1	149	5745	-6.30	6.02	-0.28	8	PASS
	157	5785	-6.59	6.02	-0.57	8	PASS
	165	5825	-6.48	6.02	-0.46	8	PASS
2	149	5745	-6.00	6.02	0.02	8	PASS
	157	5785	-5.68	6.02	0.34	8	PASS
	165	5825	-5.87	6.02	0.15	8	PASS
3	149	5745	-5.85	6.02	0.17	8	PASS
	157	5785	-5.84	6.02	0.18	8	PASS
	165	5825	-5.73	6.02	0.29	8	PASS

### 802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-9.29	6.02	-3.27	8	PASS
	157	5785	-9.01	6.02	-2.99	8	PASS
	165	5825	-9.57	6.02	-3.55	8	PASS
1	149	5745	-7.90	6.02	-1.88	8	PASS
	157	5785	-8.22	6.02	-2.20	8	PASS
	165	5825	-7.90	6.02	-1.88	8	PASS
2	149	5745	-9.33	6.02	-3.31	8	PASS
	157	5785	-8.36	6.02	-2.34	8	PASS
	165	5825	-9.28	6.02	-3.26	8	PASS
3	149	5745	-9.00	6.02	-2.98	8	PASS
	157	5785	-9.16	6.02	-3.14	8	PASS
	165	5825	-9.62	6.02	-3.60	8	PASS





A D T

### 802.11n (HT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-12.46	6.02	-6.44	8	PASS
	159	5795	-12.36	6.02	-6.34	8	PASS
1	151	5755	-10.34	6.02	-4.32	8	PASS
	159	5795	-8.41	6.02	-2.39	8	PASS
2	151	5755	-11.97	6.02	-5.95	8	PASS
	159	5795	-11.90	6.02	-5.88	8	PASS
3	151	5755	-11.53	6.02	-5.51	8	PASS
	159	5795	-12.34	6.02	-6.32	8	PASS

## 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
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 : Jan. 11, 2013

### 4.6.3 TEST PROCEDURE

#### Measurement Procedure - Reference Level

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

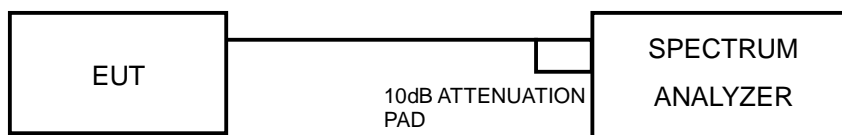
### Measurement Procedure –Unwanted Emission Level

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

#### 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.

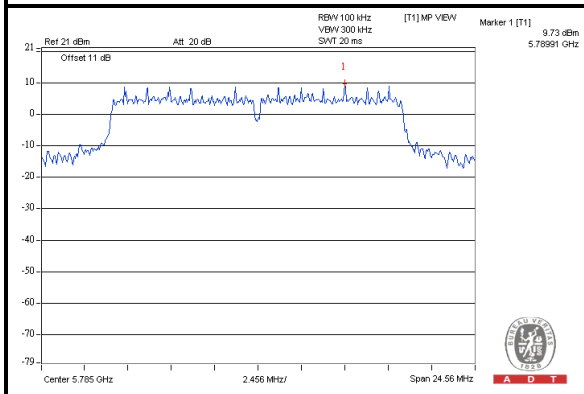


A D T

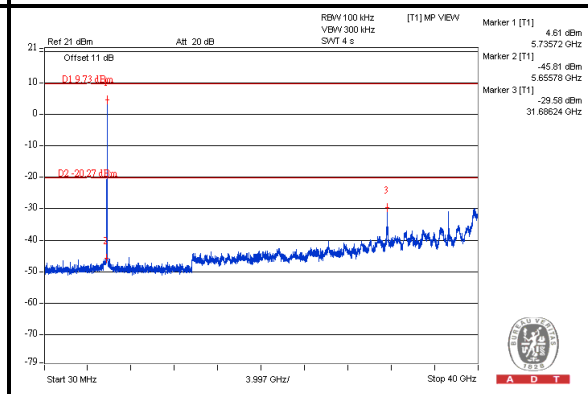
### 802.11a

### For Chain(0)

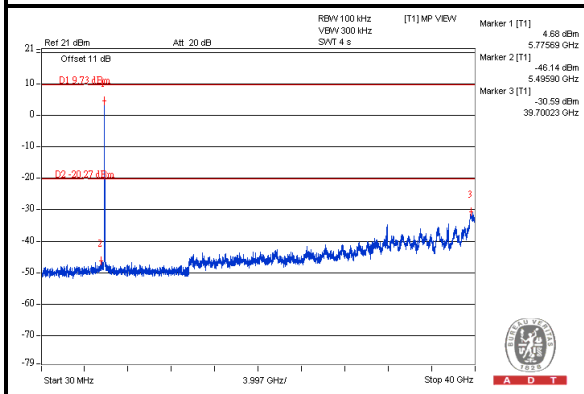
### Maximum REF



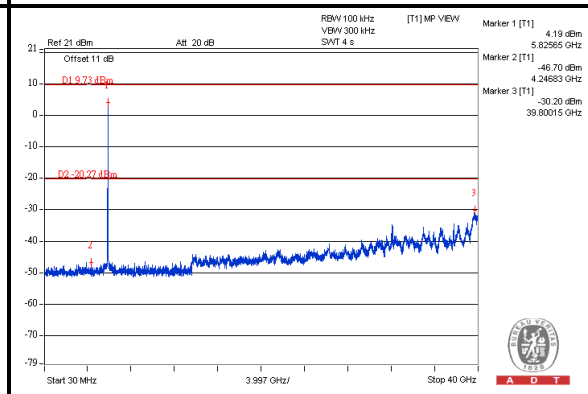
### CH 149



### CH 157



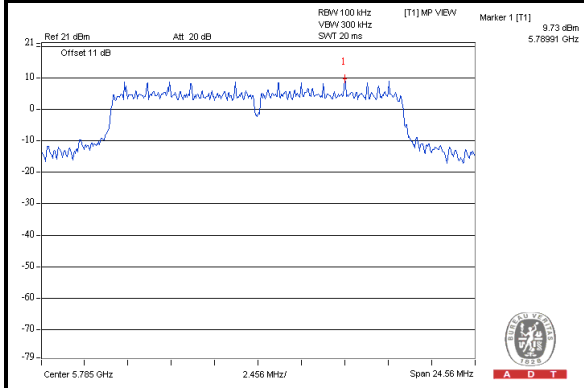
### CH 165



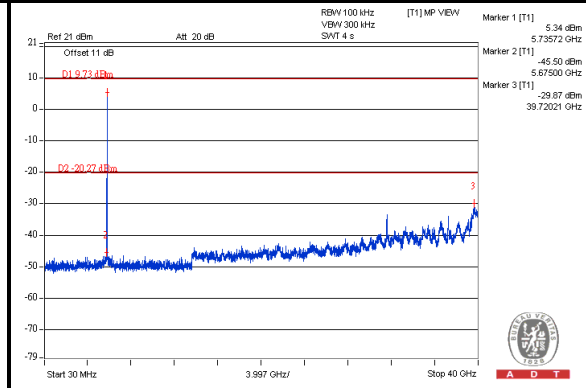


A D T

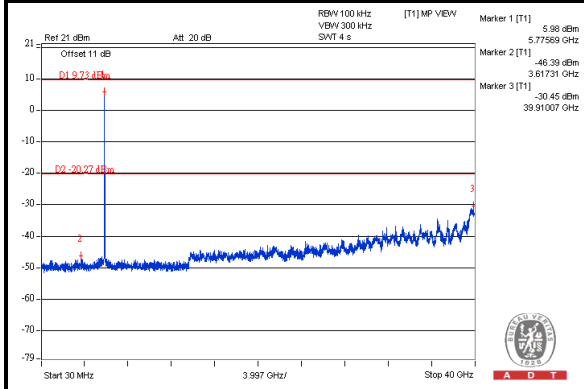
### For Chain(1) Maximum REF



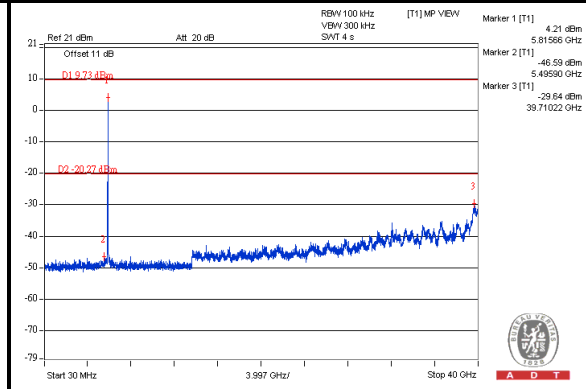
### CH 149



### CH 157



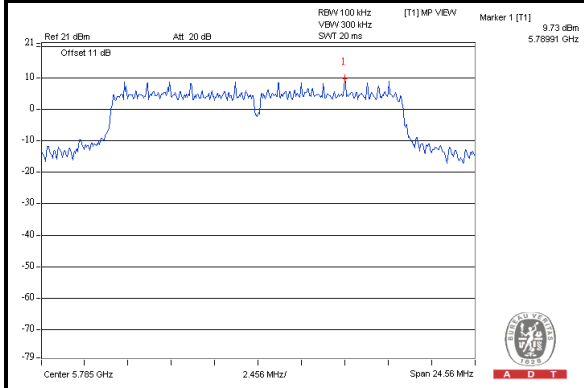
### CH 165



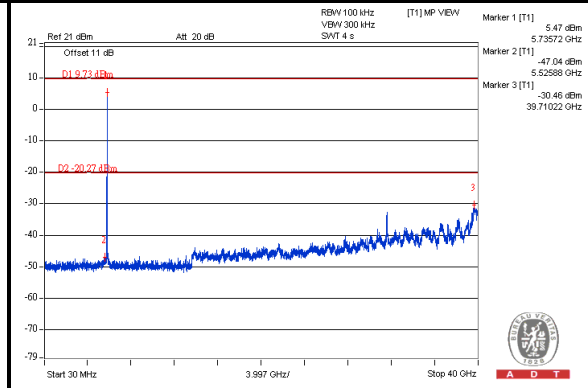


A D T

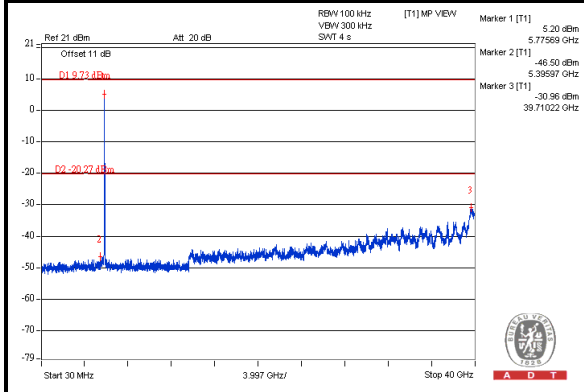
### For Chain(2) Maximum REF



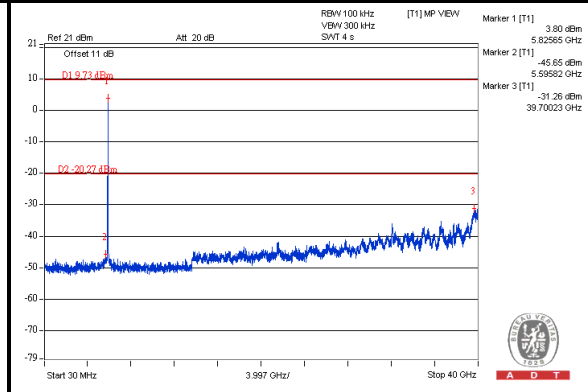
### CH 149



### CH 157



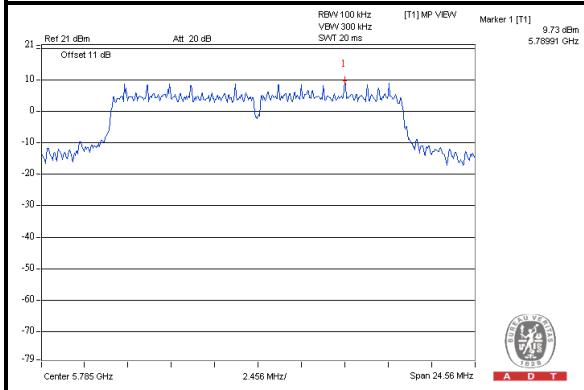
### CH 165



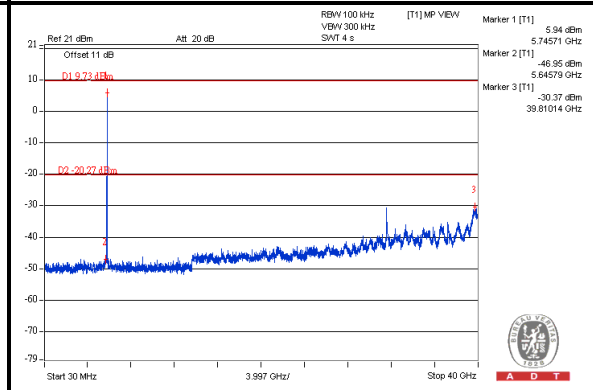


A D T

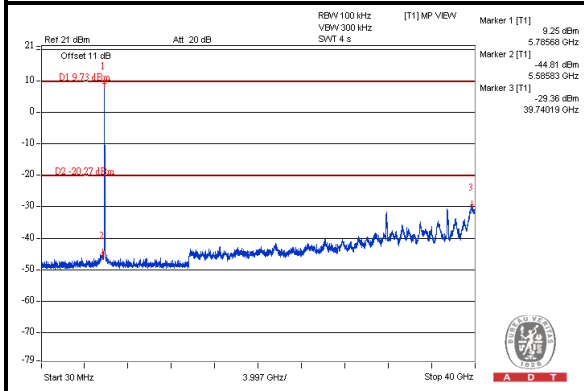
### For Chain(3) Maximum REF



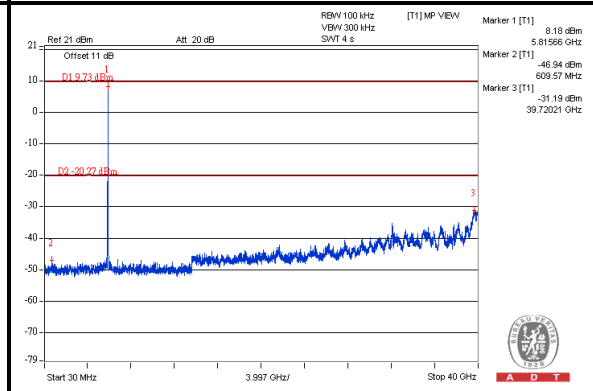
### CH 149



### CH 157



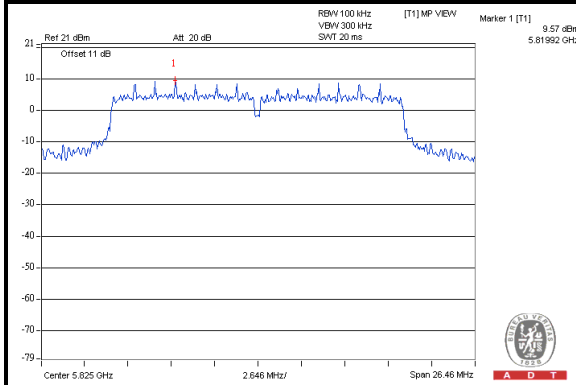
### CH 165



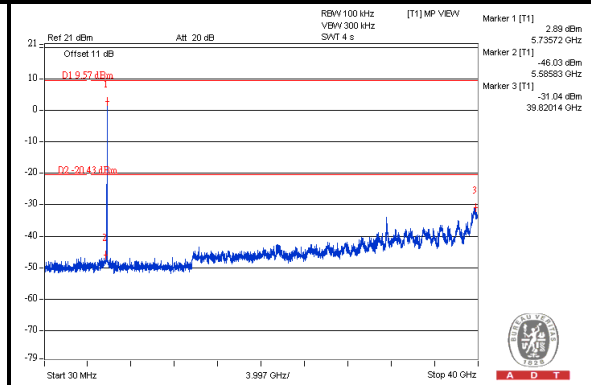
### 802.11n (HT20)

#### For Chain(0)

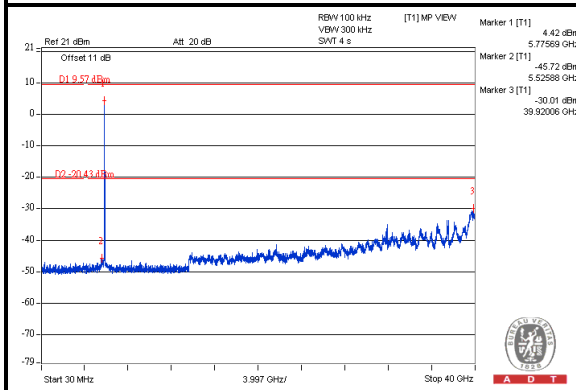
#### Maximum REF



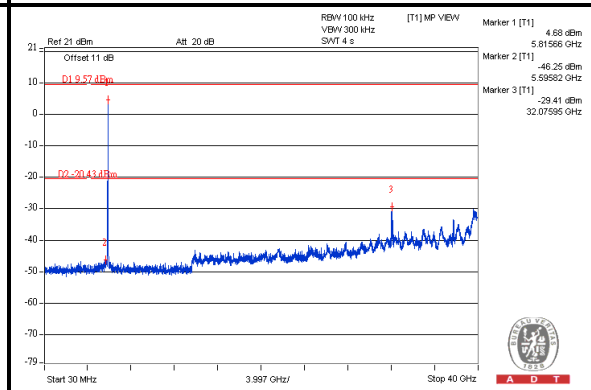
#### CH 149



#### CH 157



#### CH 165

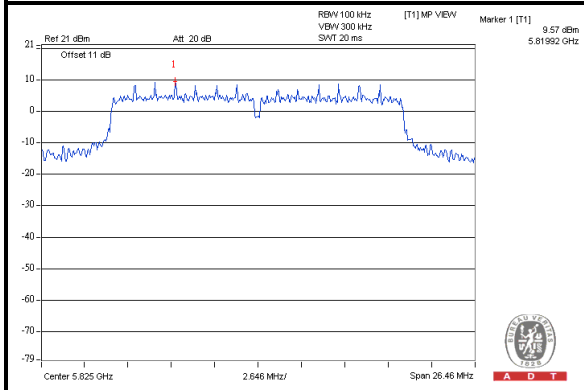




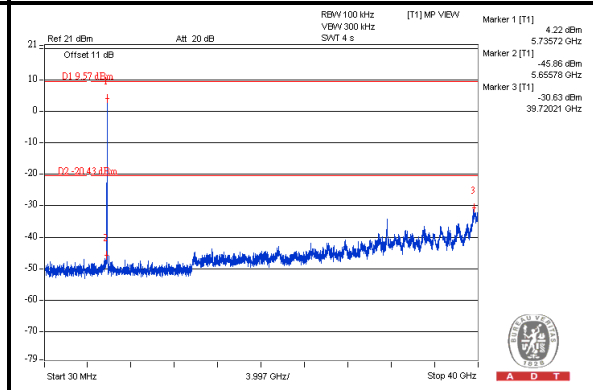


A D T

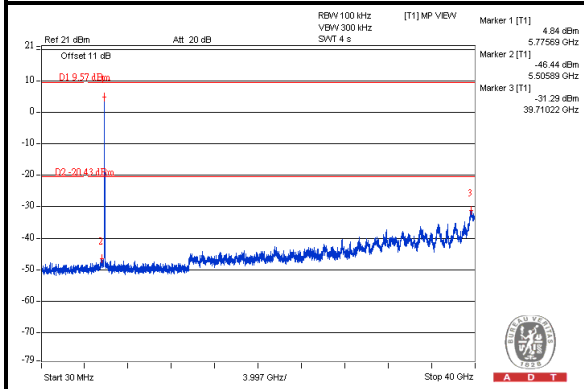
### For Chain(1) Maximum REF



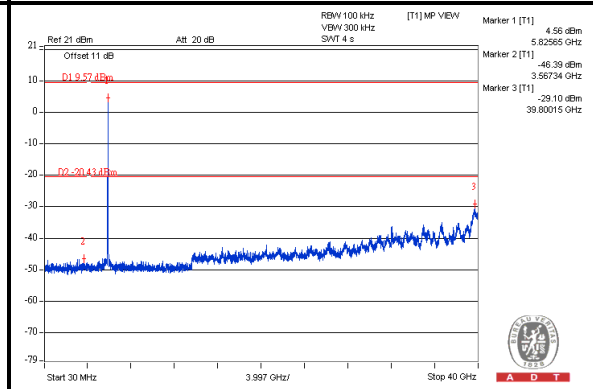
### CH 149



### CH 157



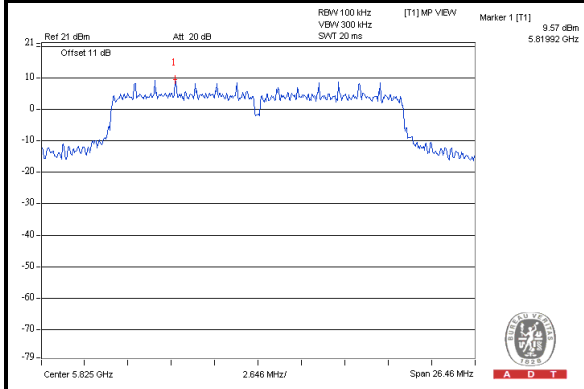
### CH 165



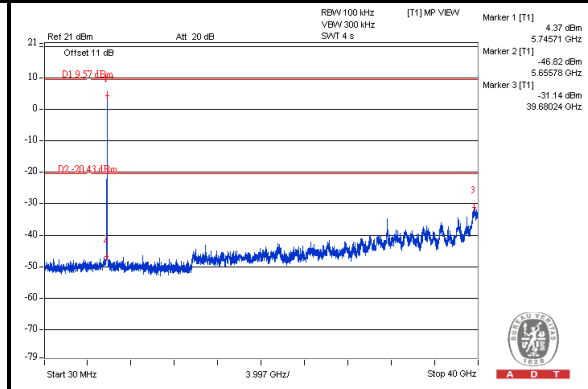


A D T

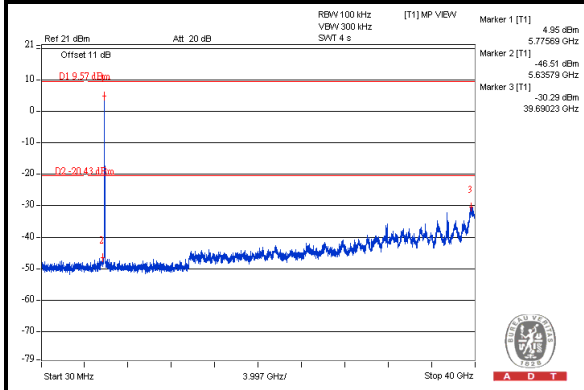
### For Chain(2) Maximum REF



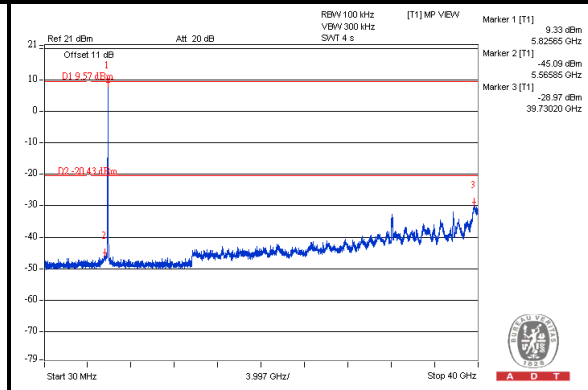
### CH 149



### CH 157



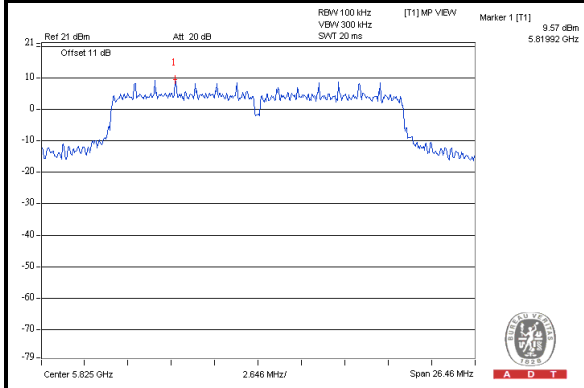
### CH 165



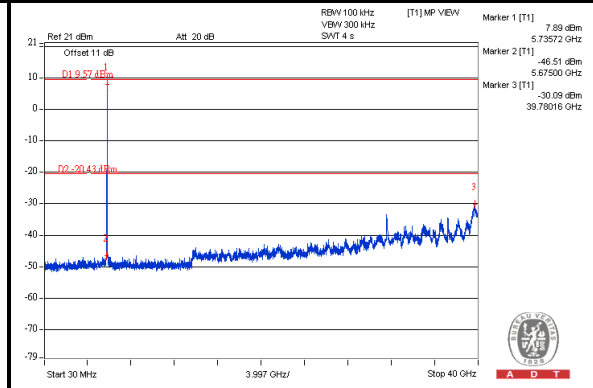


A D T

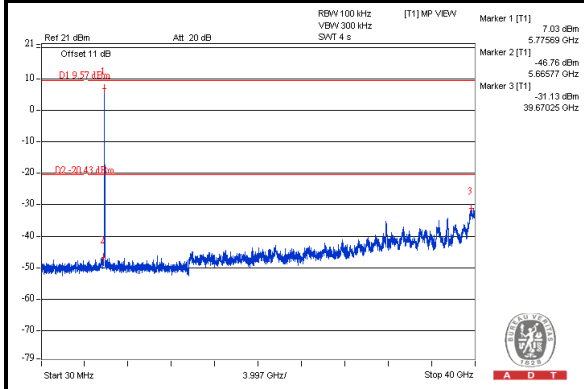
### For Chain(3) Maximum REF



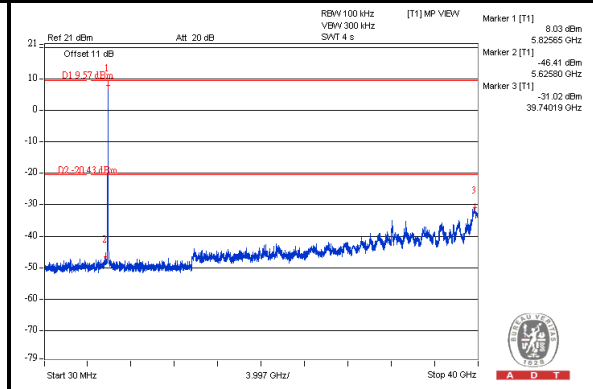
### CH 149



### CH 157



### CH 165



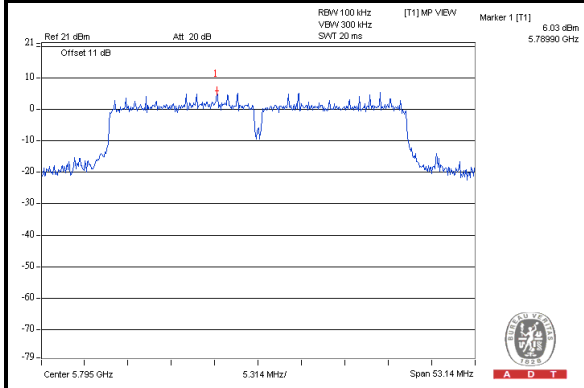


A D T

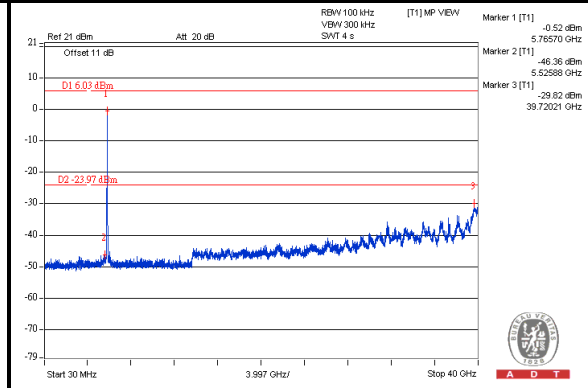
### 802.11n (HT40)

#### For Chain(0)

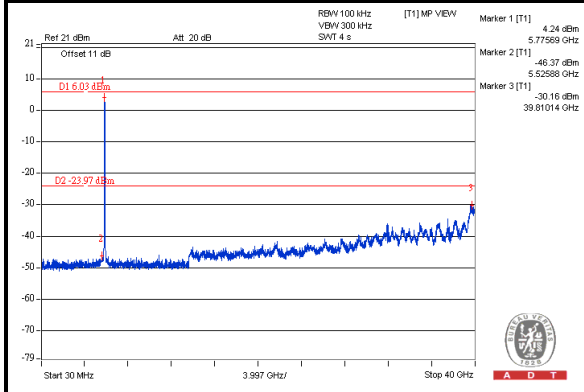
#### Maximum REF



#### CH 151



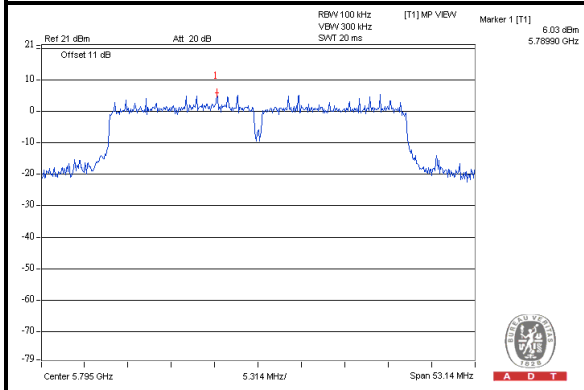
#### CH 159



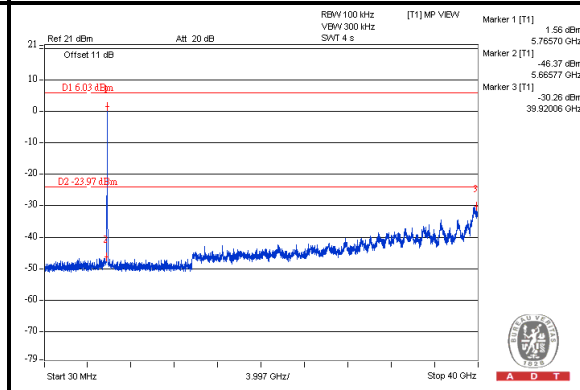


A D T

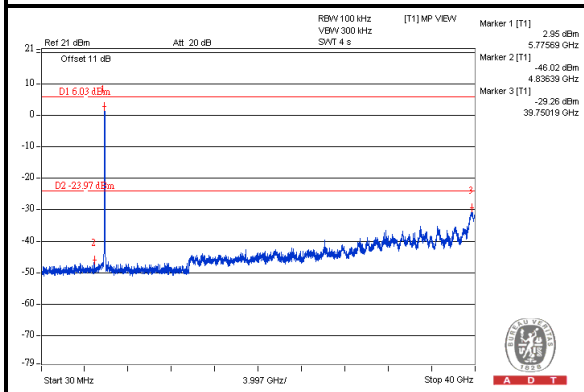
### For Chain(1) Maximum REF



### CH 151



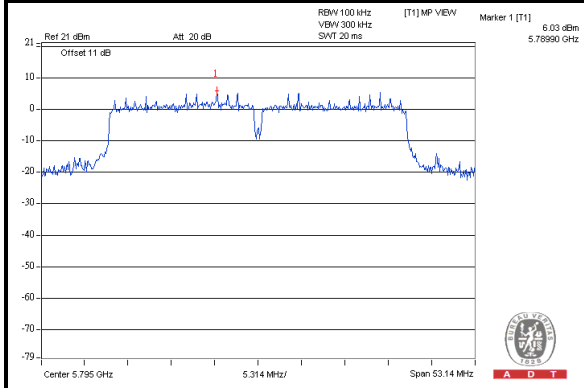
### CH 159



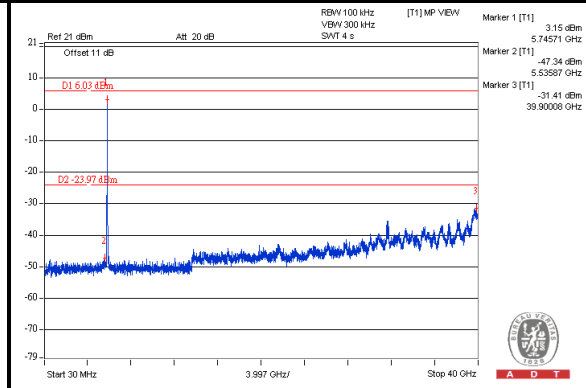


A D T

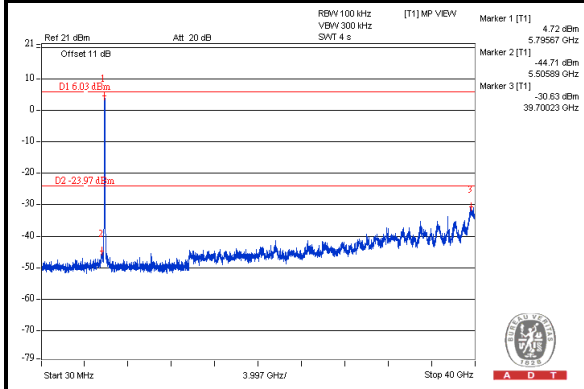
### For Chain(2) Maximum REF



### CH 151



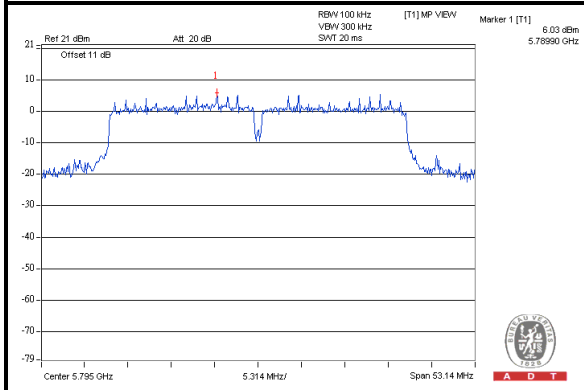
### CH 159



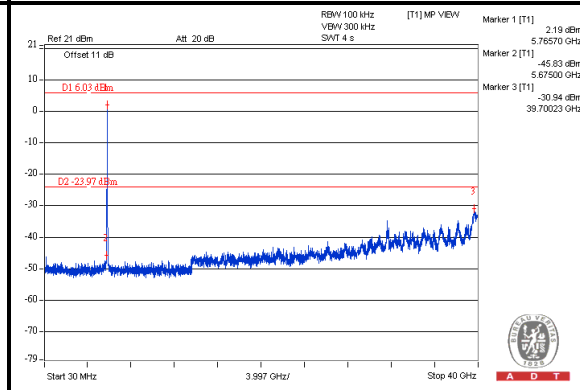


A D T

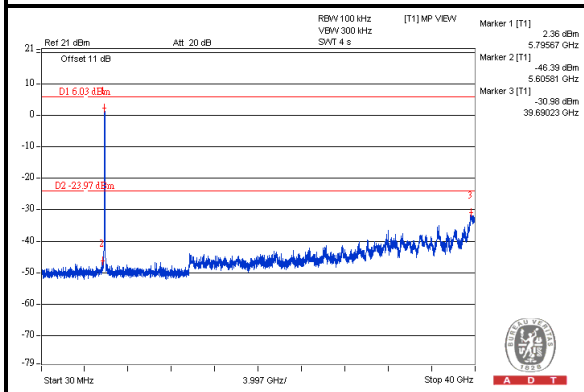
### For Chain(3) Maximum REF



### CH 151



### CH 159





A D T

## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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







## 6. INFORMATION ON THE TESTING LABORATORIES

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

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

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety/Telecom Lab:**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://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 ---