



A D T

FCC TEST REPORT (CO-LOCATED)

REPORT NO.: RF111102C24A-2

MODEL NO.: DIR-825

(Refer to item 3.1 for the more details)

FCC ID: KA2IR825C1

RECEIVED: Nov. 16, 2011

TESTED: Nov. 16 ~ Dec. 21, 2011

ISSUED: Dec. 26, 2011

APPLICANT: D-Link Corporation

ADDRESS: 17595 Mt. Herrmann, Fountain Valley, CA
92708, U.S.A.

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,
New Taipei City, Taiwan (R.O.C)

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan,
R.O.C.

This test report consists of 35 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval or endorsement by TAF or any government agency. The test results in the report only apply to the tested sample.





A D T

TABLE OF CONTENTS

RELEASE CONTROL RECORD	3
1. CERTIFICATION	4
2. SUMMARY OF TEST RESULTS	5
2.1 MEASUREMENT UNCERTAINTY	5
3. GENERAL INFORMATION	6
3.1 GENERAL DESCRIPTION OF EUT	6
3.2 DESCRIPTION OF TEST MODES	9
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST	10
3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	11
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	12
3.4 DESCRIPTION OF SUPPORT UNITS	13
4. TEST TYPES AND RESULTS	14
4.1 RADIATED EMISSION MEASUREMENT	14
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	14
4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS	14
4.1.3 TEST INSTRUMENTS	15
4.1.4 TEST PROCEDURES	16
4.1.5 DEVIATION FROM TEST STANDARD	16
4.1.6 TEST SETUP	17
4.1.7 EUT OPERATING CONDITIONS	17
4.1.8 TEST RESULTS	18
4.2 CONDUCTED EMISSION MEASUREMENT	26
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	26
4.2.2 TEST INSTRUMENTS	26
4.2.3 TEST PROCEDURES	27
4.2.4 DEVIATION FROM TEST STANDARD	27
4.2.5 TEST SETUP	28
4.2.6 EUT OPERATING CONDITIONS	28
4.2.7 TEST RESULTS	29
5. PHOTOGRAPHS OF THE TEST CONFIGURATION	33
6. INFORMATION ON THE TESTING LABORATORIES	34
7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	35



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Dec. 26, 2011



A D T

1. CERTIFICATION

PRODUCT: Xtreme N Dual Band Gigabit Router

MODEL: DIR-825 (Refer to item 3.1 for the more details)

BRAND: D-Link

APPLICANT: D-Link Corporation

TESTED: Nov. 16 ~ Dec. 21, 2011

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**

FCC Part 15, Subpart E (Section 15.407)

ANSI C63.4-2003

ANSI C63.10-2009

The above equipment (Model: DIR-825) 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. 26, 2011
Pettie Chen / Specialist

APPROVED BY :  , DATE : Dec. 26, 2011
Gary Chang / Technical 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) FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207 15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.76dB at 0.201MHz.
15.247(d) 15.407(b/1/2/3) (b)(5)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5150 & 5360 & 5440MHz.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Xtreme N Dual Band Gigabit Router
MODEL NO.	DIR-825 (Refer to NOTE for the more details)
FCC ID	KA2IR825C1
POWER SUPPLY	12Vdc (adapter)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5180 ~ 5240MHz, 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) 5.0GHz: 5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	501.4mW for 2412 ~ 2462MHz 43.3mW for 5180 ~ 5240MHz 779.9mW for 5745 ~ 5825MHz
ANTENNA TYPE	Dipole antenna with 2dBi gain
ANTENNA CONNECTOR	R-SMA
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. Simultaneous transmission test result is required and submitted since 2.4 and 5GHz can transmit simultaneously and share a common antenna.

2. All models are listed as below.

Model	Difference
DIR-825	With USB port & switch, White
DIR-825/N	Without USB port & switch, Black

* Model: DIR-825 was the worst for final test.

3. The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	2412~2462	5180~5240	5745~5825
802.11b	√		
802.11g	√		
802.11a		√	√
802.11n (20MHz)	√	√	√
802.11n (40MHz)	√	√	√

4. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and three receivers.

MODULATION MODE	TX FUNCTION
802.11b	1TX / 2TX
802.11g	2TX
802.11a	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

5. The EUT uses following adapters.

Adapter 1	
Brand	D-Link
Model	CG2412-B
Input Power	100-120Vac, 0.5A, 50-60Hz
Output Power	+12Vdc, 2A
Power Line	1.8m non-shielded cable w/o core

Adapter 2	
Brand	D-Link
Model	CG2412-B IW
Input Power	100-120Vac, 0.6A, 50-60Hz
Output Power	+12Vdc, 2A
Power Line	1.8m non-shielded cable w/o core

Adapter 3	
Brand	D-Link
Model	CG2412-B
Input Power	100-240Vac, 0.5A, 50-60Hz
Output Power	+12Vdc, 2A
Power Line	1.8m non-shielded cable w/o core

Adapter 4	
Brand	D-Link
Model	CG2412-B IW
Input Power	100-240Vac, 0.6A, 50-60Hz
Output Power	+12Vdc, 2A
Power Line	1.8m non-shielded cable w/o core

* Adapter 3 was the worst for the final test.

6. The above EUT information is 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

FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2422MHz	5	2442MHz
2	2427MHz	6	2447MHz
3	2432MHz	7	2452MHz
4	2437MHz		

Operated in 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190MHz	46	5230MHz

Operated in 5745 ~ 5825MHz

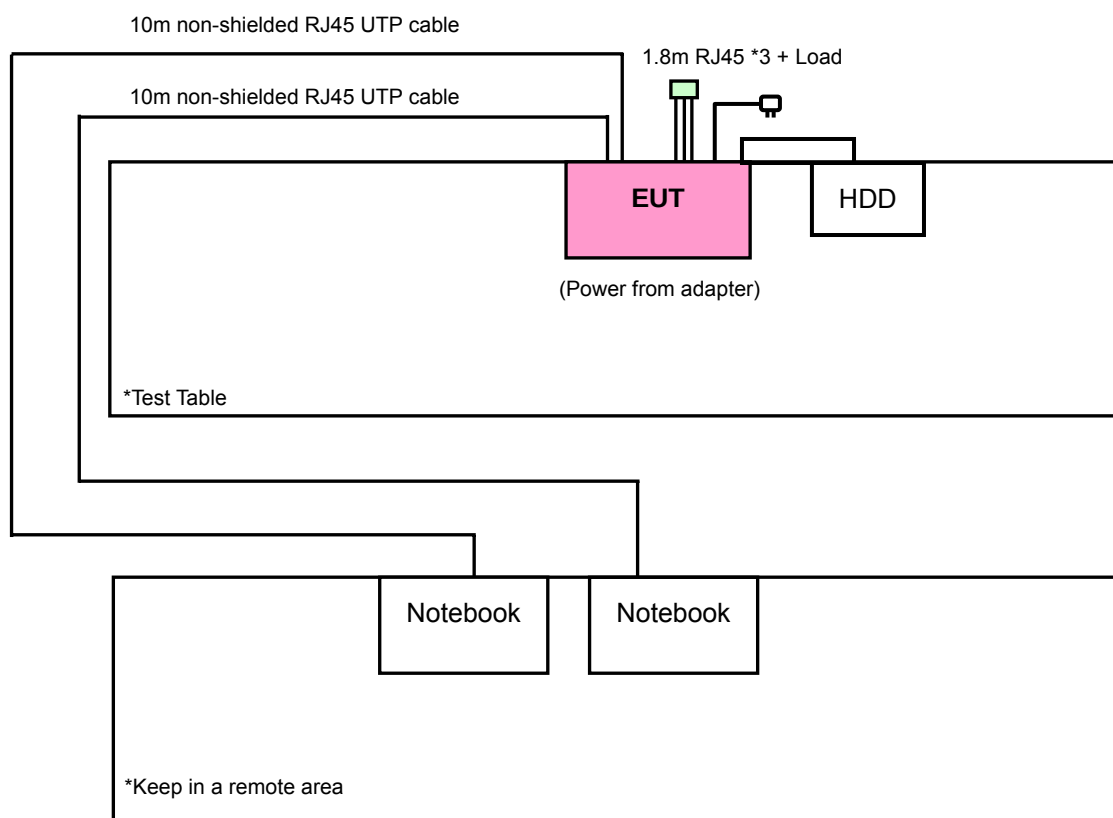
5 channels are provided for 802.11a, 802.11n (20MHz):

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

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE≥1G	RE<1G	CE	
-	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz

CE: Conducted Emission Measurement

NOTE: Test modes as below are composed of the max output power channel of each band.

RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	FREQ. RANGE (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g +802.11an (40MHz)	2412~2462	1 to 11	6 + 38	OFDM	BPSK	6.0
	5190~5230	38 to 46				15.0
802.11g +802.11an (20MHz)	2412~2462	1 to 11	6 + 149	OFDM	BPSK	6.0
	5745~5825	149 to 165				7.2

RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	FREQ. RANGE (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g +802.11an (40MHz)	2412~2462	1 to 11	6 + 38	OFDM	BPSK	6.0
	5190~5230	38 to 46				15.0
802.11g +802.11an (20MHz)	2412~2462	1 to 11	6 + 149	OFDM	BPSK	6.0
	5745~5825	149 to 165				7.2

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	FREQ. RANGE (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g +802.11an (40MHz)	2412~2462	1 to 11	6 + 38	OFDM	BPSK	6.0
	5190~5230	38 to 46				15.0
802.11g +802.11an (20MHz)	2412~2462	1 to 11	6 + 149	OFDM	BPSK	6.0
	5745~5825	149 to 165				7.2

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin
RE<1G	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Anderson Hong

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 (Section 15.247)

FCC Part 15, Subpart E (Section 15.407)

ANSI C63.4-2003

ANSI C63.10-2009

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



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	DELL	D531	CN-0XM006-48643-8 1U-2973	QDS-BRCM1020
2	NOTEBOOK	DELL	D531	CN-0XM006-48643-8 1U-2786	QDS-BRCM1020
3	EXTERNAL HARD DISK	Terasys	F12-UF	A0100222-4A50003	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable without core.
2	10m RJ45 UTP cable without core.
3	1.5 m shielded cable, terminated with USB connector, w/o core.

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

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

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. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

FREQUENCIES (MHz)	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m) *NOTE 3
	PK	PK
5150 ~ 5250	-27	68.3

NOTE: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$



A D T

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2011	Apr. 18, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 06, 2011	Jan. 05, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 06, 2011	Sep. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 13, 2011	Aug. 12, 2012
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 29, 2011	Oct. 28, 2012

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 9.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC 7450F-4.

4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

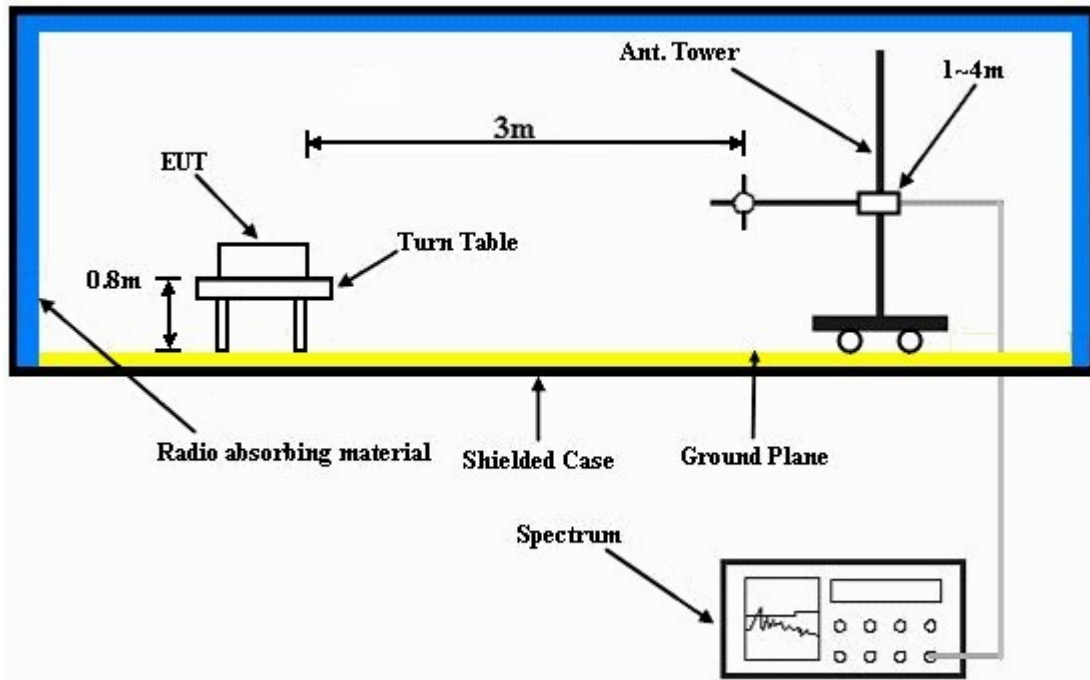
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 DEVIATION FROM TEST STANDARD

No deviation

4.1.6 TEST SETUP



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

4.1.7 EUT OPERATING CONDITIONS

- Placed the EUT on the testing table.
- Prepared notebooks to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".
- The communication partner read and wrote with the external hard disk via EUT.

4.1.8 TEST RESULTS

802.11g + 802.11an (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

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	105.7 PK			1.03 H	332	74.00	31.70
2	*2437.00	95.8 AV			1.03 H	332	64.10	31.70
3	2753.00	55.8 PK	74.00	-18.2	1.15 H	296	23.10	32.70
4	2753.00	44.7 AV	54.00	-9.3	1.15 H	296	12.00	32.70
5	#3249.00	50.8 PK	68.30	-17.5	1.02 H	298	16.90	33.90
6	4874.00	58.2 PK	74.00	-15.8	1.18 H	298	20.40	37.80
7	4874.00	44.0 AV	54.00	-10.0	1.18 H	298	6.20	37.80
8	5150.00	61.3 PK	74.00	-12.7	1.03 H	311	22.90	38.40
9	5150.00	44.5 AV	54.00	-9.5	1.03 H	311	6.10	38.40
10	*5190.00	95.3 PK			1.03 H	311	56.90	38.40
11	*5190.00	84.1 AV			1.03 H	311	45.70	38.40
12	5440.00	50.6 PK	74.00	-23.4	1.00 H	89	11.70	38.90
13	5440.00	42.3 AV	54.00	-11.7	1.00 H	89	3.40	38.90
14	7311.00	56.1 PK	74.00	-17.9	1.45 H	357	12.20	43.90
15	7311.00	43.0 AV	54.00	-11.0	1.45 H	357	-0.9	43.90
16	#10380.00	58.1 PK	68.30	-10.2	1.20 H	310	9.8	48.30

- 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.
 7. “#”:The radiated frequency is out the restricted band.



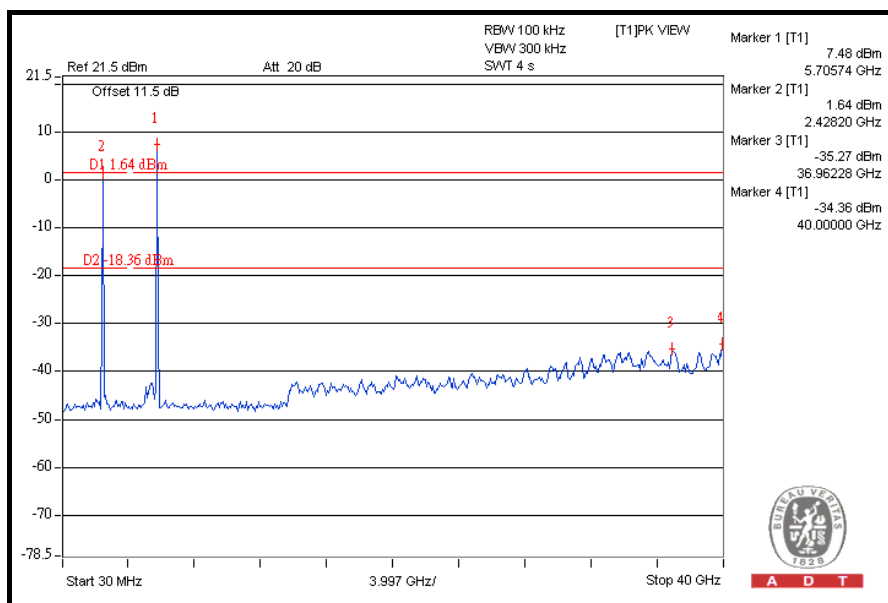
A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	TESTED BY	Sun Lin

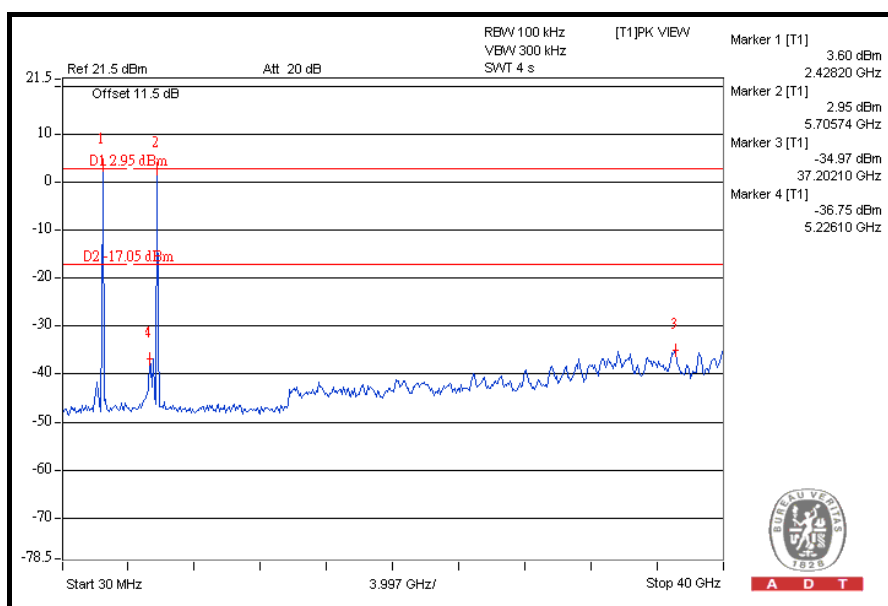
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	115.1 PK			1.12 V	15	83.40	31.70
2	*2437.00	103.7 AV			1.12 V	15	72.00	31.70
3	2753.00	60.1 PK	74.00	-13.9	1.08 V	53	27.40	32.70
4	2753.00	51.8 AV	54.00	-2.2	1.08 V	53	19.10	32.70
5	#3249.00	52.7 PK	68.30	-15.6	1.07 V	257	18.80	33.90
6	4874.00	65.5 PK	74.00	-8.5	1.00 V	272	27.70	37.80
7	4874.00	50.3 AV	54.00	-3.7	1.00 V	272	12.50	37.80
8	5150.00	70.1 PK	74.00	-3.9	1.05 V	350	31.70	38.40
9	5150.00	53.0 AV	54.00	-1.0	1.05 V	350	14.60	38.40
10	*5190.00	105.9 PK			1.05 V	10	67.50	38.40
11	*5190.00	94.3 AV			1.05 V	10	55.90	38.40
12	5440.00	62.5 PK	74.00	-11.5	1.00 V	36	23.60	38.90
13	5440.00	53.0 AV	54.00	-1.0	1.00 V	36	14.10	38.90
14	7311.00	68.4 PK	74.00	-5.6	1.77 V	322	24.50	43.90
15	7311.00	52.4 AV	54.00	-1.6	1.77 V	322	8.50	43.90
16	#10380.00	60.5 PK	68.30	-7.8	1.86 V	259	12.20	48.30

- 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.
 7. “#”: The radiated frequency is out the restricted band.

Conducted Emission of Chain 0



Conducted Emission of Chain 1





A D T

802.11g + 802.11an (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

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	105.70 PK			1.03 H	332	74.00	31.70
2	*2437.00	95.80 AV			1.03 H	332	64.10	31.70
3	3249.00	52.20 PK	74.00	-21.80	1.07 H	45	18.30	33.90
4	3249.00	48.70 AV	54.00	-5.30	1.07 H	45	14.80	33.90
5	3308.00	52.20 PK	74.00	-21.80	1.01 H	308	18.20	34.00
6	3308.00	40.90 AV	54.00	-13.10	1.01 H	308	6.90	34.00
7	4874.00	58.20 PK	74.00	-15.80	1.18 H	298	20.40	37.80
8	4874.00	44.00 AV	54.00	-10.00	1.18 H	298	6.20	37.80
9	5360.00	52.10 PK	74.00	-21.90	1.31 H	4	13.40	38.70
10	5360.00	40.50 AV	54.00	-13.50	1.31 H	4	1.80	38.70
11	5400.00	53.20 PK	74.00	-20.80	1.23 H	53	14.40	38.80
12	5400.00	43.20 AV	54.00	-10.80	1.23 H	53	4.40	38.80
13	#5725.00	76.90 PK	83.60	-6.70	1.40 H	194	37.50	39.40
14	#5725.00	63.50 AV	72.50	-9.00	1.40 H	194	24.10	39.40
15	*5745.00	103.60 PK			1.04 H	14	64.10	39.50
16	*5745.00	92.50 AV			1.04 H	14	53.00	39.50
17	7311.00	56.10 PK	74.00	-17.90	1.45 H	357	12.20	43.90
18	7311.00	43.00 AV	54.00	-11.00	1.45 H	357	-0.90	43.90
19	11490.00	64.70 PK	74.00	-9.30	1.33 H	238	15.00	49.70
20	11490.00	50.70 AV	54.00	-3.30	1.33 H	238	1.00	49.70

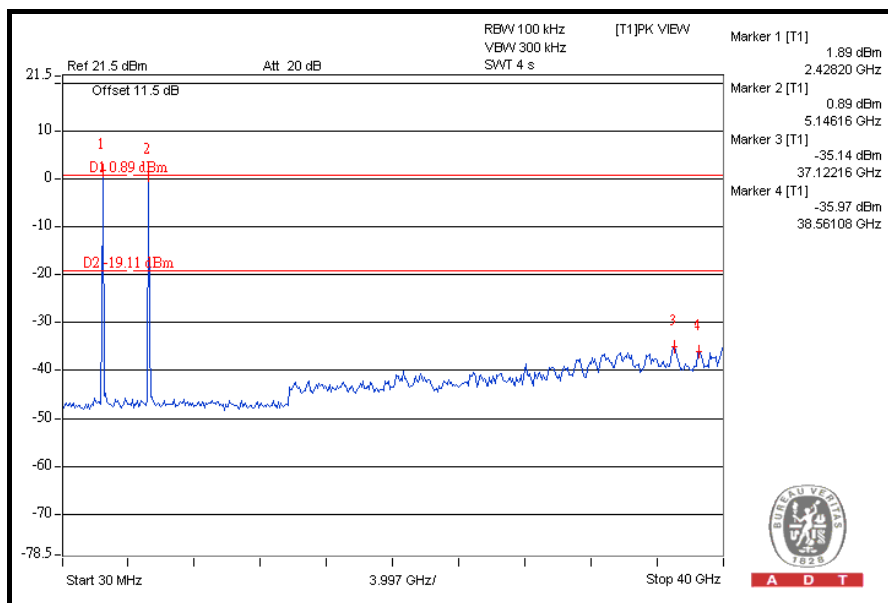
- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
 2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.
 5. “ * “: Fundamental frequency.
 6. “#”: The radiated frequency is out the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Sun Lin

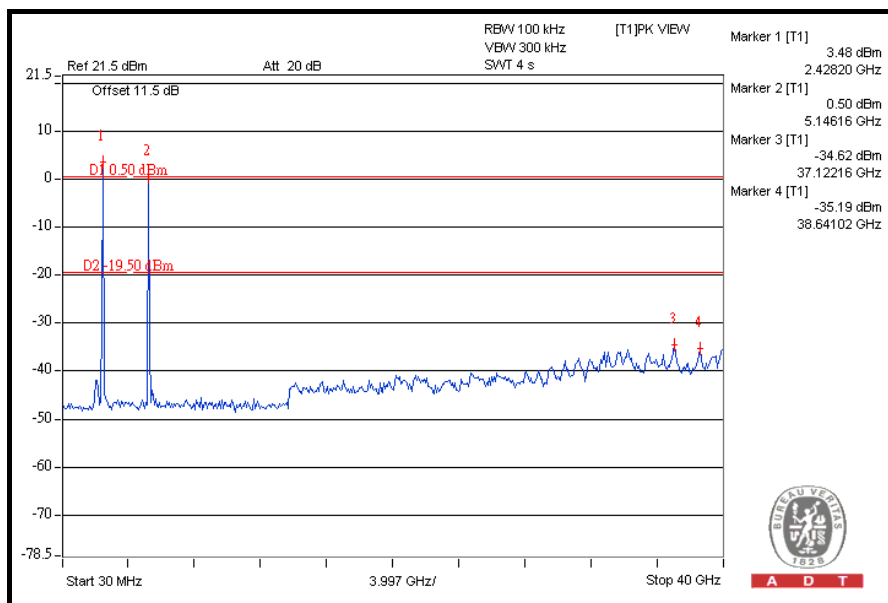
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	115.10 PK			1.12 V	15	83.40	31.70
2	*2437.00	103.70 AV			1.12 V	15	72.00	31.70
3	3249.00	62.60 PK	74.00	-11.40	1.00 V	258	28.70	33.90
4	3249.00	52.80 AV	54.00	-1.20	1.00 V	258	18.90	33.90
5	3308.00	45.20 PK	74.00	-28.80	1.00 V	335	11.20	34.00
6	3308.00	33.50 AV	54.00	-20.50	1.00 V	335	-0.50	34.00
7	4874.00	65.50 PK	74.00	-8.50	1.00 V	272	27.70	37.80
8	4874.00	50.30 AV	54.00	-3.70	1.00 V	272	12.50	37.80
9	5360.00	61.20 PK	74.00	-12.80	1.12 V	50	22.50	38.70
10	5360.00	53.00 AV	54.00	-1.00	1.12 V	50	14.30	38.70
11	5400.00	62.40 PK	74.00	-11.60	1.00 V	50	23.60	38.80
12	5400.00	52.70 AV	54.00	-1.30	1.00 V	50	13.90	38.80
13	#5725.00	89.00 PK	92.60	-3.60	1.16 V	169	49.60	39.40
14	#5725.00	70.80 AV	81.00	-10.20	1.16 V	169	31.40	39.40
15	*5745.00	112.60 PK			1.16 V	169	73.10	39.50
16	*5745.00	101.00 AV			1.16 V	169	61.50	39.50
17	7311.00	68.40 PK	74.00	-5.60	1.77 V	322	24.50	43.90
18	7311.00	52.40 AV	54.00	-1.60	1.77 V	322	8.50	43.90
19	11490.00	71.80 PK	74.00	-2.20	1.48 V	186	22.10	49.70
20	11490.00	52.80 AV	54.00	-1.20	1.48 V	186	3.10	49.70

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 radiated frequency is out the restricted band.

Conducted Emission of Chain 0



Conducted Emission of Chain 1



BELOW 1GHz WORST-CASE DATA : 802.11g + 802.11an (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 38	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH	TESTED BY	Sun Lin

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	125.17	31.8 QP	43.5	-11.7	1.50 H	262	19.80	12.00
2	374.04	34.1 QP	46.0	-11.9	1.00 H	46	17.70	16.40
3	480.97	33.0 QP	46.0	-13.0	1.50 H	235	13.90	19.10
4	599.58	39.8 QP	46.0	-6.2	1.25 H	334	17.70	22.10
5	624.85	40.8 QP	46.0	-5.2	1.00 H	28	18.40	22.40
6	720.12	42.4 QP	46.0	-3.6	1.00 H	1	19.00	23.40
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	125.17	35.7 QP	43.5	-7.8	1.00 V	229	23.70	12.00
2	189.33	33.1 QP	43.5	-10.4	1.25 V	307	22.30	10.80
3	374.04	33.0 QP	46.0	-13.0	1.00 V	10	16.60	16.40
4	599.58	37.9 QP	46.0	-8.1	1.50 V	1	15.80	22.10
5	624.85	40.6 QP	46.0	-5.4	1.50 V	178	18.20	22.40
6	720.12	37.2 QP	46.0	-8.8	1.00 V	238	13.80	23.40

- 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

802.11g + 802.11an (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 6 + CH 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 55%RH	TESTED BY	Sun Lin

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	158.22	35.6 QP	43.5	-7.9	1.50 H	295	21.40	14.20
2	599.58	37.8 QP	46.0	-8.2	1.50 H	334	15.70	22.10
3	624.85	41.2 QP	46.0	-4.8	1.00 H	32	18.80	22.40
4	720.12	40.6 QP	46.0	-5.4	1.25 H	196	17.20	23.40
5	825.11	36.4 QP	46.0	-9.6	2.00 H	280	11.60	24.80
6	961.21	38.5 QP	54.0	-15.5	1.50 H	346	11.90	26.60
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	70.73	32.9 QP	40.0	-7.1	1.50 V	51	21.80	11.10
2	125.17	33.0 QP	43.5	-10.5	1.25 V	128	21.00	12.00
3	374.04	33.3 QP	46.0	-12.7	1.50 V	97	16.90	16.40
4	599.58	37.0 QP	46.0	-9.0	2.00 V	1	14.90	22.10
5	624.85	39.3 QP	46.0	-6.7	1.50 V	166	16.90	22.40
6	961.21	38.8 QP	54.0	-15.2	1.50 V	214	12.20	26.60

- 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.

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 23, 2011	Nov. 22, 2012
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 30, 2010	Dec. 29, 2011
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 06, 2011	Jan. 05, 2012
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 22, 2011	Feb. 21, 2012
V-LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jun. 30, 2011	Jun. 29, 2012
LISN ROHDE & SCHWARZ	ENV216	100072	Jun. 10, 2011	Jun. 09, 2012
Software ADT	ADT_Cond_ V7.3.7	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

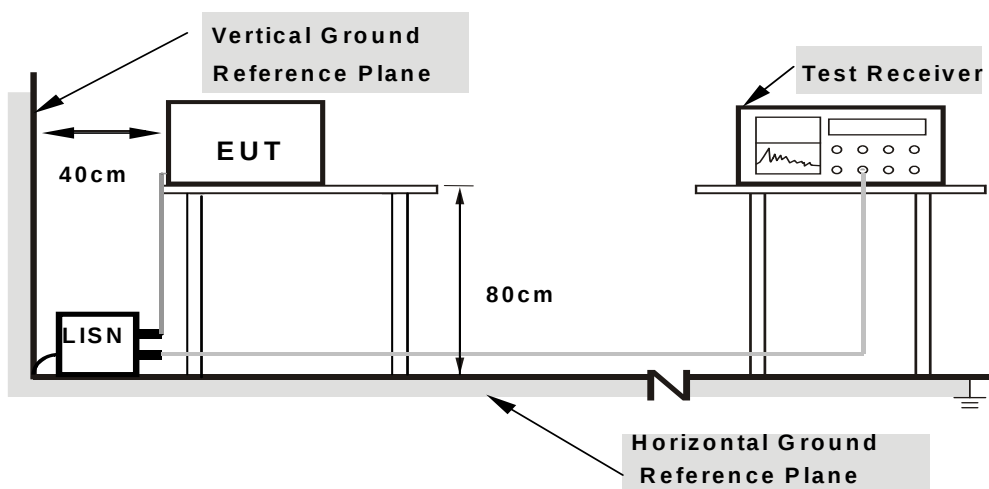
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

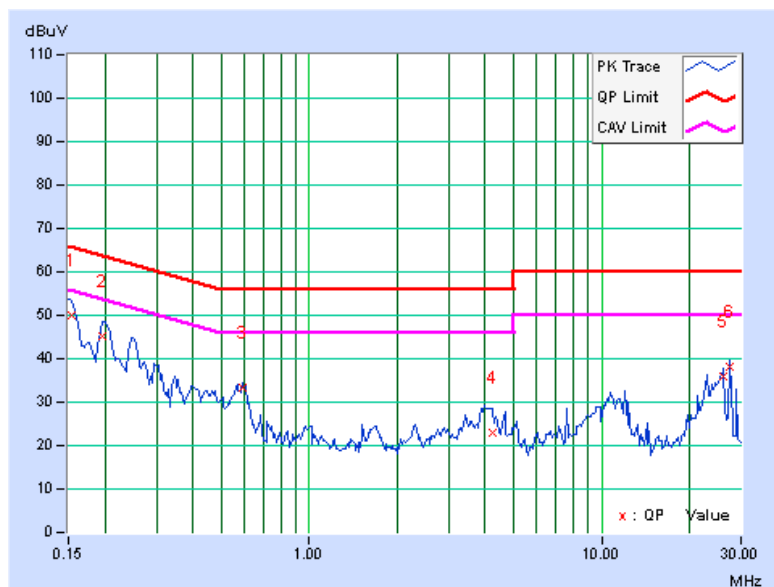
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA: 802.11g + 802.11an (40MHz)

CHANNEL	CH 6 + CH 38	6dB BANDWIDTH	9kHz
PHASE	Line 1		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.12	49.93	42.48	50.05	42.60	65.79	55.79	-15.74	-13.19
2	0.197	0.12	44.95	39.25	45.07	39.37	63.74	53.74	-18.67	-14.37
3	0.591	0.13	33.27	27.81	33.40	27.94	56.00	46.00	-22.60	-18.06
4	4.223	0.32	22.76	14.61	23.08	14.93	56.00	46.00	-32.92	-31.07
5	25.938	1.40	34.36	33.61	35.76	35.01	60.00	50.00	-24.24	-14.99
6	27.461	1.45	36.65	36.57	38.10	38.02	60.00	50.00	-21.90	-11.98

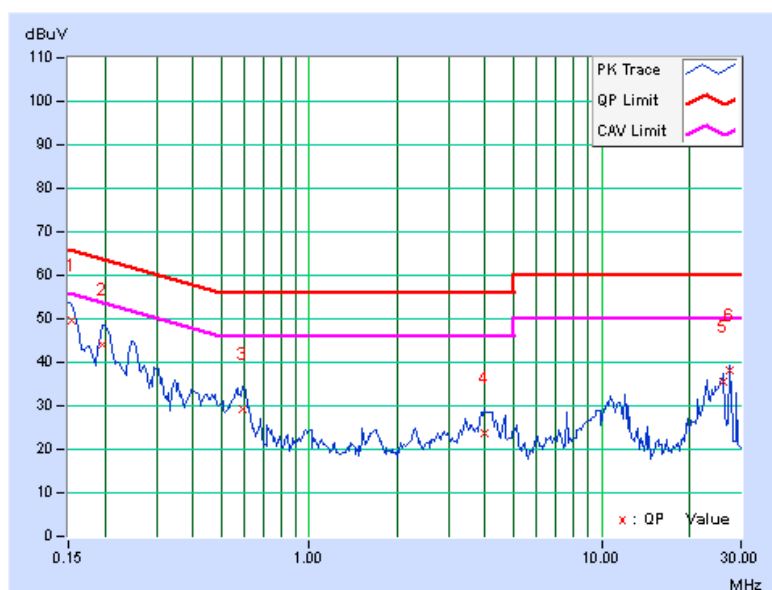
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



CHANNEL	CH 6 + CH 38	6dB BANDWIDTH	9kHz
PHASE	Line 2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.13	49.32	42.40	49.45	42.53	65.79	55.79	-16.34	-13.26
2	0.197	0.13	43.92	38.44	44.05	38.57	63.74	53.74	-19.69	-15.17
3	0.591	0.15	29.13	22.80	29.28	22.95	56.00	46.00	-26.72	-23.05
4	3.988	0.32	23.29	11.91	23.61	12.23	56.00	46.00	-32.39	-33.77
5	25.938	1.13	34.40	31.83	35.53	32.96	60.00	50.00	-24.47	-17.04
6	27.461	1.16	37.12	36.85	38.28	38.01	60.00	50.00	-21.72	-11.99

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.

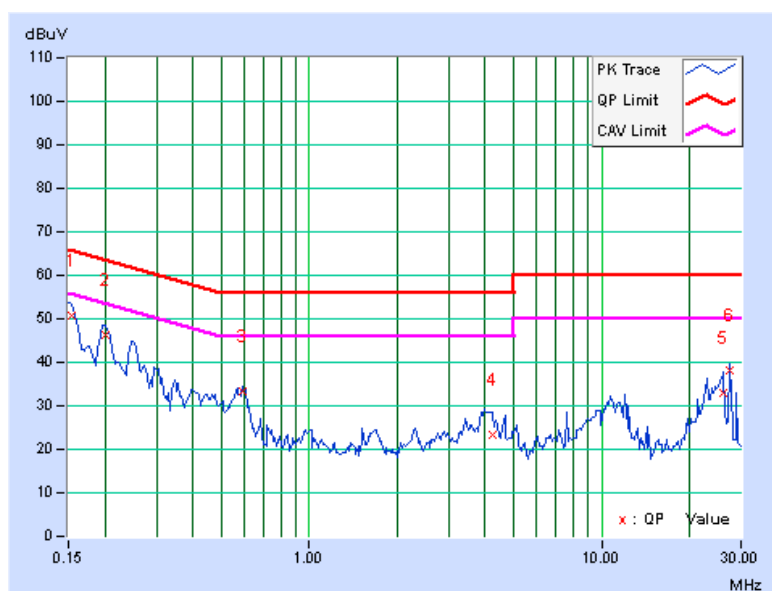


802.11g + 802.11an (20MHz)

CHANNEL	CH 6 + CH 149	6dB BANDWIDTH	9kHz
PHASE	Line 1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.12	50.74	42.86	50.86	42.98	65.79	55.79	-14.93	-12.81
2	0.201	0.12	46.30	41.70	46.42	41.82	63.58	53.58	-17.16	-11.76
3	0.591	0.13	33.02	27.81	33.15	27.94	56.00	46.00	-22.85	-18.06
4	4.223	0.32	22.99	14.65	23.31	14.97	56.00	46.00	-32.69	-31.03
5	25.934	1.40	31.65	29.96	33.05	31.36	60.00	50.00	-26.95	-18.64
6	27.461	1.45	36.69	36.51	38.14	37.96	60.00	50.00	-21.86	-12.04

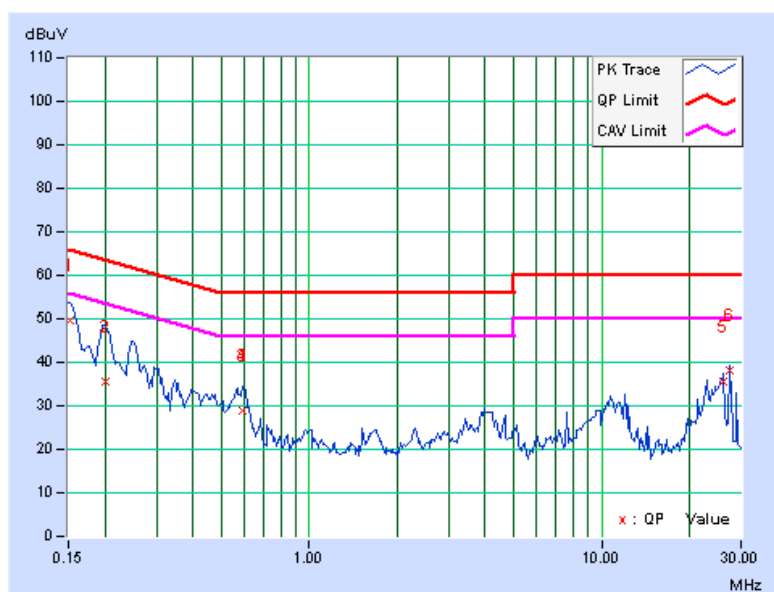
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



CHANNEL	CH 6 + CH 149	6dB BANDWIDTH	9kHz
PHASE	Line 2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.153	0.13	49.35	42.60	49.48	42.73	65.86	55.86	-16.39	-13.14
2	0.201	0.13	35.56	31.39	35.69	31.52	63.58	53.58	-27.89	-22.06
3	0.591	0.15	28.91	22.85	29.06	23.00	56.00	46.00	-26.94	-23.00
4	0.591	0.15	28.87	22.87	29.02	23.02	56.00	46.00	-26.98	-22.98
5	25.938	1.13	34.36	32.45	35.49	33.58	60.00	50.00	-24.51	-16.42
6	27.461	1.16	36.81	36.20	37.97	37.36	60.00	50.00	-22.03	-12.64

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



A D T

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.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml.

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

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: 886-3-3185050

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

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---