FCC TEST REPORT
(CO-LOCATED)

REPORT NO.:	RF130104C26A-1
MODEL NO.:	XR500
FCC ID:	SK6-XR520
IC:	5428A-XR520
RECEIVED:	Mar. 28, 2013
TESTED:	Apr. 11, 2013
ISSUED:	Apr. 17, 2013

APPLICANT:	Xirrus, INC
ADDRESS:	2101 Corporate Center Drive Thousand Oaks, California 91320
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 report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130104C26A-1	Original release	Apr. 17, 2013

1. CERTIFICATION

PRODUCT:	Xirrus Wireless Array
MODEL:	XR500
BRAND:	Xirrus
APPLICANT:	Xirrus, INC
TESTED:	Apr. 11, 2013
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	FCC Part 15, Subpart E (Section 15.407)
	Canada RSS-210 Issue 8 (2010-12)
	Canada RSS-Gen Issue 3 (2010-12)
	ANSI C63.10-2009

The above equipment (Model: XR500) 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 :** Apr. 17, 2013
Jemma Yang / Specialist

APPROVED BY : _____ , **DATE :** Apr. 17, 2013
Ken Liu / Senior 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) RSS-210; RSS-Gen			
Standard Section		Test Type and Limit	Result	Remark
FCC Part 15	CANADA STANDARD			
15.207 15.407(b)(5)	RSS-Gen 7.2.4	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -2.12dB at 19.71094MHz.
15.247(d) 15.407(b/1/2/3) (b)(5)	RSS-Gen A8.5, A9.2	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.5dB at 2386.00MHz.

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	3.34 dB
	200MHz ~1000MHz	3.35 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	Xirrus Wireless Array
MODEL NO.	XR500
POWER SUPPLY	55Vdc (from POE)
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:** 5260 ~ 5320MHz & 5500 ~ 5700MHz
NUMBER OF CHANNEL	**2.4GHz:** 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) **5.0GHz:** **5260 ~ 5320MHz:** 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) **5500 ~ 5700MHz:** 8 for 802.11a, 802.11n (20MHz) 3 for 802.11n (40MHz)
OUTPUT POWER	729.260mW for 2412 ~ 2462MHz 103.767mW for 5260 ~ 5320MHz 103.822mW for 5500 ~ 5700MHz
ANTENNA TYPE	PCB antenna with 4dBi gain
ANTENNA CONNECTOR	I - PEX
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	NA

NOTE:

1. This report is issued as a supplementary report of BV ADT report no.: RF130104C26-2. This report shall be combined together with its original report.
2. This report is prepared for FCC class II permissive change. Difference compared with the original report is adding 5260~5320MHz and 5500~5700MHz band. Therefore the EUT is re-tested in this report.
3. Simultaneous transmission test result is required and submitted since 2.4 and 5GHz can transmit simultaneously and share a common antenna.

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

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

5. The EUT has two modules and transmitters would not simultaneously operate in each 5G band.

NO	TYPE
A	2.4G+5G combo
B	5G only

6. The EUT consumes power from the following POE.

POE	
BRAND:	PowerDsine
MODEL:	PD9001G
INPUT:	100-250Vac, 50/60Hz, 0.8A
OUTPUT:	55Vdc, 0.6A

* POE was supplied for optional accessory.

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

FOR 5260 ~ 5320MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

FOR 5500 ~ 5700MHz

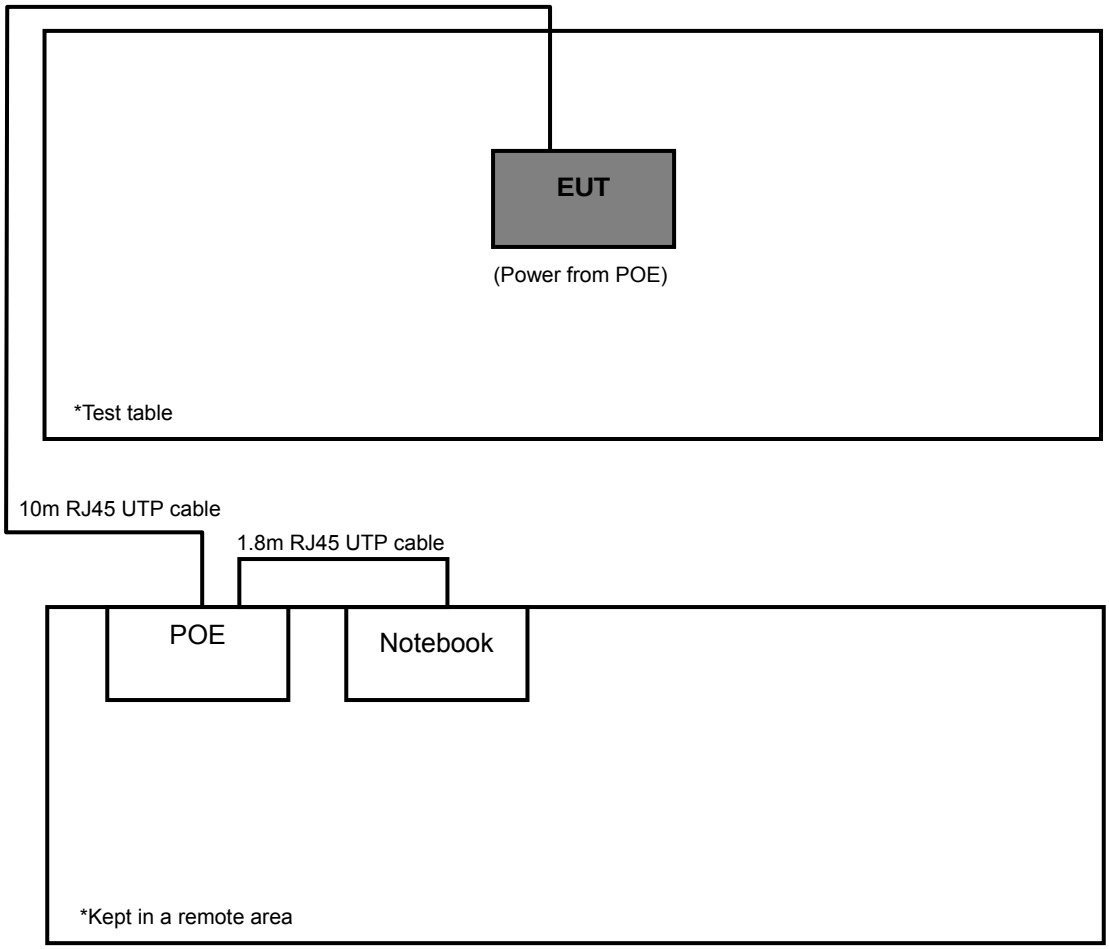
8 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100	5500 MHz	116	5580 MHz
104	5520 MHz	132	5660 MHz
108	5540 MHz	136	5680 MHz
112	5560 MHz	140	5700 MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
102	5510 MHz	134	5670 MHz
110	5550 MHz		

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)
802.11b	2412 ~ 2462	1 to 11	1 + 60	OFDM	BPSK	1.0
802.11a	5260 ~ 5320	52 to 64				6.0
802.11b	2412 ~ 2462	1 to 11	1 + 116	OFDM	BPSK	1.0
802.11a	5500 ~ 5700	100 to 140				6.0

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)
802.11b	2412 ~ 2462	1 to 11	1 + 60	OFDM	BPSK	1.0
802.11a	5260 ~ 5320	52 to 64				6.0
802.11b	2412 ~ 2462	1 to 11	1 + 116	OFDM	BPSK	1.0
802.11a	5500 ~ 5700	100 to 140				6.0

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)
802.11b	2412 ~ 2462	1 to 11	1 + 60	OFDM	BPSK	1.0
802.11a	5260 ~ 5320	52 to 64				6.0
802.11b	2412 ~ 2462	1 to 11	1 + 116	OFDM	BPSK	1.0
802.11a	5500 ~ 5700	100 to 140				6.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	55Vdc	Chris Lin
RE<1G	25deg. C, 65%RH	55Vdc	Chris Lin
PLC	20deg. C, 70%RH	55Vdc	Match Tsui

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)
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)
ANSI C63.4-2009
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	POE	POWERDSINE	PD9001G	NA	NA
2	Notebook	DELL	E5420	33MKMQ1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m non-shielded RJ45 Cable, without core
2	1.8m non-shielded RJ45 Cable, without core.

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 acted as communication partner to transfer data.

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:

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

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jan. 31, 2013	Jan. 30, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Mar. 20, 2013	Mar. 19, 2014
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8449B	3008A01964	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 28, 2012	Aug. 27, 2013
Software BV ADT	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 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. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 3.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 988962.
6. The IC Site Registration No. is 7450F-3.

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.

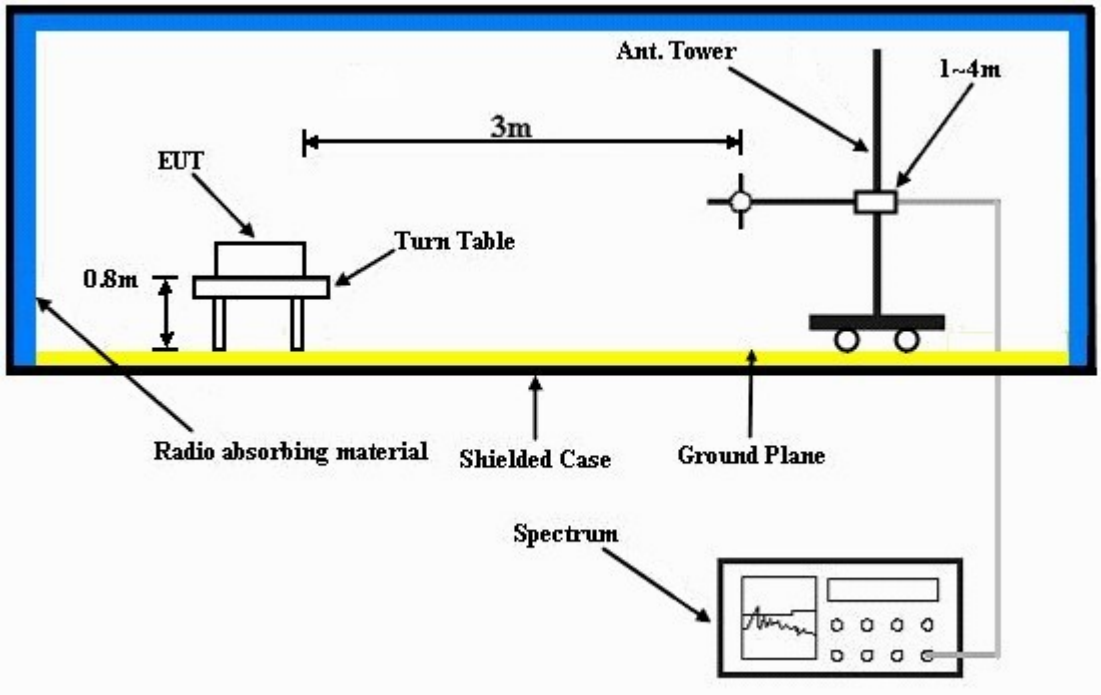
NOTE:

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

a. Placed the EUT on the testing table.
b. Prepared notebook to act as communication partner and placed it outside of testing area.
c. 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.
d. The communication partner sent data to EUT by command "PING".

4.1.8 TEST RESULTS

802.11b + 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 60	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris 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	2390.00	54.7 PK	74.0	-19.3	1.39 H	157	23.90	30.80
2	2390.00	46.3 AV	54.0	-7.7	1.39 H	157	15.50	30.80
3	*2412.00	105.7 PK			1.39 H	157	74.80	30.90
4	*2412.00	102.7 AV			1.39 H	157	71.80	30.90
5	4824.00	46.5 PK	74.0	-27.5	1.17 H	96	9.50	37.00
6	4824.00	39.6 AV	54.0	-14.4	1.17 H	96	2.60	37.00
7	*5300.00	102.5 PK			1.02 H	154	64.60	37.90
8	*5300.00	92.6 AV			1.02 H	154	54.70	37.90
9	10600.00	56.7 PK	74.0	-17.3	1.29 H	52	7.50	49.20
10	10600.00	44.2 AV	54.0	-9.8	1.29 H	52	-5.00	49.20
11	15900.00	57.5 PK	74.0	-16.5	1.27 H	65	9.80	47.70
12	15900.00	44.6 AV	54.0	-9.4	1.27 H	65	-3.10	47.70

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 1 + CH 60	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris 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	2386.00	58.6 PK	74.0	-15.4	1.00 V	332	27.80	30.80
2	2386.00	52.4 AV	54.0	-1.6	1.00 V	332	21.60	30.80
3	2390.00	57.8 PK	74.0	-16.2	1.15 V	332	27.00	30.80
4	2390.00	47.7 AV	54.0	-6.3	1.15 V	332	16.90	30.80
5	*2412.00	109.8 PK			1.15 V	332	78.90	30.90
6	*2412.00	105.7 AV			1.15 V	332	74.80	30.90
7	4824.00	48.8 PK	74.0	-25.2	1.04 V	336	11.80	37.00
8	4824.00	44.5 AV	54.0	-9.5	1.04 V	336	7.50	37.00
9	*5300.00	112.3 PK			1.11 V	203	74.40	37.90
10	*5300.00	102.2 AV			1.11 V	203	64.30	37.90
11	10600.00	60.6 PK	74.0	-13.4	1.17 V	65	11.40	49.20
12	10600.00	47.8 AV	54.0	-6.2	1.17 V	65	-1.40	49.20
13	15960.00	58.8 PK	74.0	-15.2	1.20 V	69	11.20	47.60
14	15960.00	46.6 AV	54.0	-7.4	1.20 V	69	-1.00	47.60

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.
5. " * ": Fundamental frequency.
6. "#":The radiated frequency is out the restricted band.

802.11b + 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 116	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris 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	2390.00	55.2 PK	74.0	-18.8	1.30 H	154	24.40	30.80
2	2390.00	46.6 AV	54.0	-7.4	1.30 H	154	15.80	30.80
3	*2412.00	105.9 PK			1.10 H	220	75.00	30.90
4	*2412.00	102.5 AV			1.10 H	220	71.60	30.90
5	4824.00	46.5 PK	74.0	-27.5	1.06 H	44	9.50	37.00
6	4824.00	39.5 AV	54.0	-14.5	1.06 H	44	2.50	37.00
7	*5580.00	104.2 PK			1.25 H	124	65.80	38.40
8	*5580.00	94.5 AV			1.25 H	124	56.10	38.40
9	11160.00	56.9 PK	74.0	-17.1	1.07 H	35	7.20	49.70
10	11160.00	44.2 AV	54.0	-9.8	1.07 H	35	-5.50	49.70
11	#16740.00	58.6 PK	74.0	-15.4	1.20 H	69	8.50	50.10
12	#16740.00	45.6 AV	54.0	-8.4	1.20 H	69	-4.50	50.10

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 1 + CH 116	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris 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	2386.00	58.5 PK	74.0	-15.5	1.10 V	336	27.70	30.80
2	**2386.00**	**52.5 AV**	**54.0**	**-1.5**	**1.10 V**	**336**	**21.70**	**30.80**
3	2390.00	57.8 PK	74.0	-16.2	1.14 V	325	27.00	30.80
4	2390.00	47.6 AV	54.0	-6.4	1.14 V	325	16.80	30.80
5	*2412.00	109.8 PK			1.14 V	325	78.90	30.90
6	*2412.00	105.6 AV			1.14 V	325	74.70	30.90
7	4824.00	48.9 PK	74.0	-25.1	1.10 V	126	11.90	37.00
8	4824.00	44.2 AV	54.0	-9.8	1.10 V	126	7.20	37.00
9	*5580.00	117.6 PK			1.00 V	254	79.20	38.40
10	*5580.00	107.2 AV			1.00 V	254	68.80	38.40
11	11160.00	62.5 PK	74.0	-11.5	1.20 V	63	12.80	49.70
12	11160.00	49.2 AV	54.0	-4.8	1.20 V	63	-0.50	49.70
13	#16740.00	62.2 PK	74.0	-11.8	1.47 V	51	12.10	50.10
14	#16740.00	47.8 AV	-54.0	-6.2	1.47 V	51	-2.30	50.10

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.

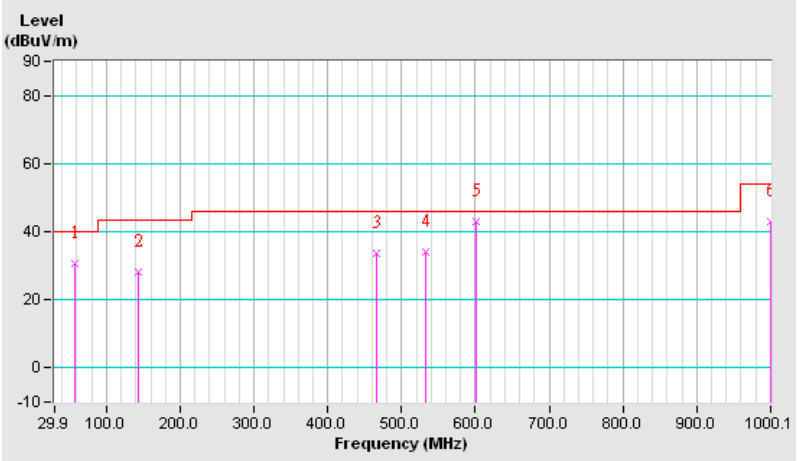
BELOW 1GHz WORST-CASE DATA：

802. 11b + 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 60	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 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	57.66	30.80 QP	40.00	-9.20	1.44 H	322	17.30	13.50
2	142.77	28.30 QP	43.50	-15.20	1.65 H	222	14.80	13.50
3	466.88	33.60 QP	46.00	-12.40	2.05 H	176	14.40	19.20
4	533.32	34.10 QP	46.00	-11.90	1.54 H	159	13.20	20.90
5	600.32	42.80 QP	46.00	-3.20	1.55 H	209	20.30	22.50
6	1000.10	42.80 QP	54.00	-11.20	1.24 H	48	14.80	28.00

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.

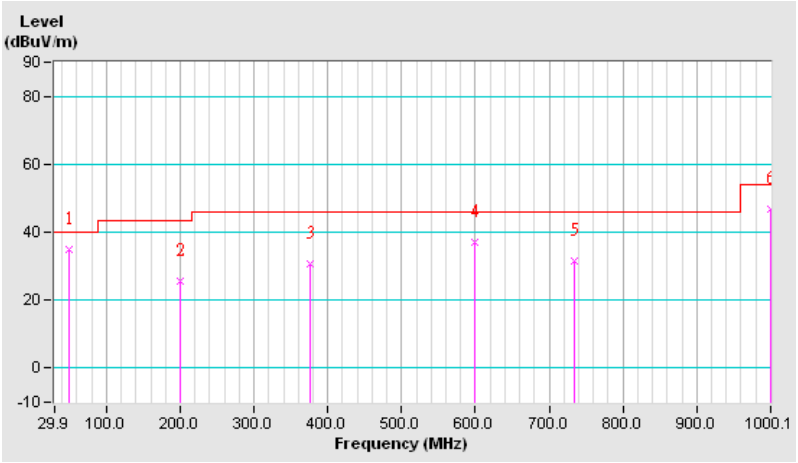


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 60	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 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	49.33	34.80 QP	40.00	-5.20	1.06 V	5	21.00	13.80
2	200.14	25.70 QP	43.50	-17.80	1.56 V	165	14.60	11.10
3	375.56	30.80 QP	46.00	-15.20	1.20 V	100	13.90	16.90
4	600.00	37.20 QP	46.00	-8.80	1.24 V	120	14.70	22.50
5	733.23	31.50 QP	46.00	-14.50	2.36 V	155	7.20	24.30
6	1000.00	46.80 QP	54.00	-7.20	1.14 V	319	18.80	28.00

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.

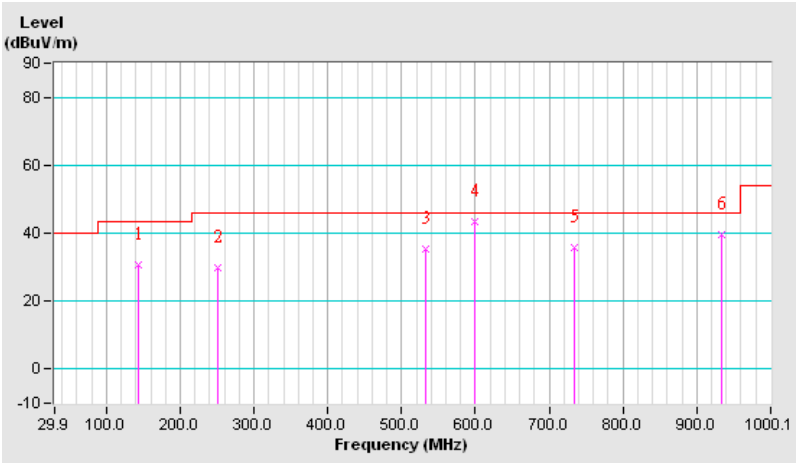


802.11b + 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 116	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 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	142.55	30.70 QP	43.50	-12.80	2.00 H	222	17.20	13.50
2	250.77	29.70 QP	46.00	-16.30	1.11 H	208	16.50	13.20
3	533.35	35.20 QP	46.00	-10.80	1.47 H	159	14.30	20.90
4	599.88	43.20 QP	46.00	-2.80	1.44 H	209	20.70	22.50
5	733.85	35.90 QP	46.00	-10.10	2.13 H	217	11.60	24.30
6	933.57	39.40 QP	46.00	-6.60	1.69 H	341	12.10	27.30

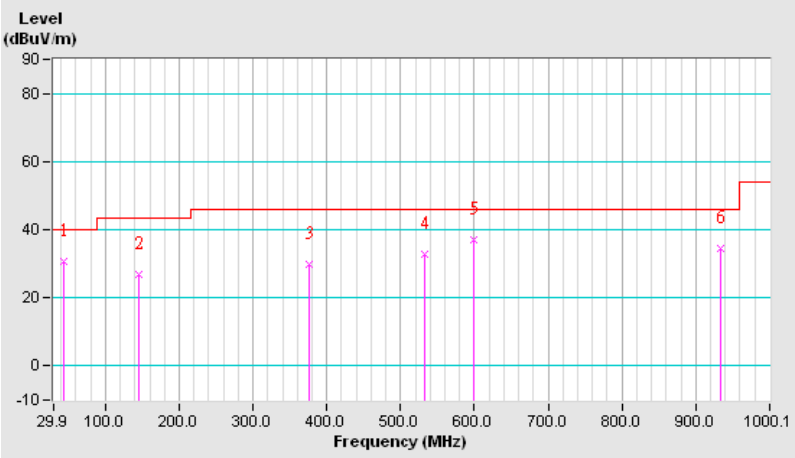
REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	CH 1 + CH 116	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	55Vdc	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Chris Lin

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 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	43.51	30.50 QP	40.00	-9.50	1.55 V	299	16.80	13.70
2	145.33	26.90 QP	43.50	-16.60	2.13 V	110	13.30	13.60
3	375.55	29.90 QP	46.00	-16.10	2.25 V	100	13.00	16.90
4	533.55	32.60 QP	46.00	-13.40	1.15 V	124	11.70	20.90
5	599.58	36.90 QP	46.00	-9.10	1.25 V	120	14.40	22.50
6	933.99	34.60 QP	46.00	-11.40	1.07 V	284	7.30	27.30

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.



4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
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	100288	Nov. 09, 2012	Nov. 08, 2013
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 21, 2012	Dec. 20, 2013
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 06, 2012	Jul. 05, 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 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.

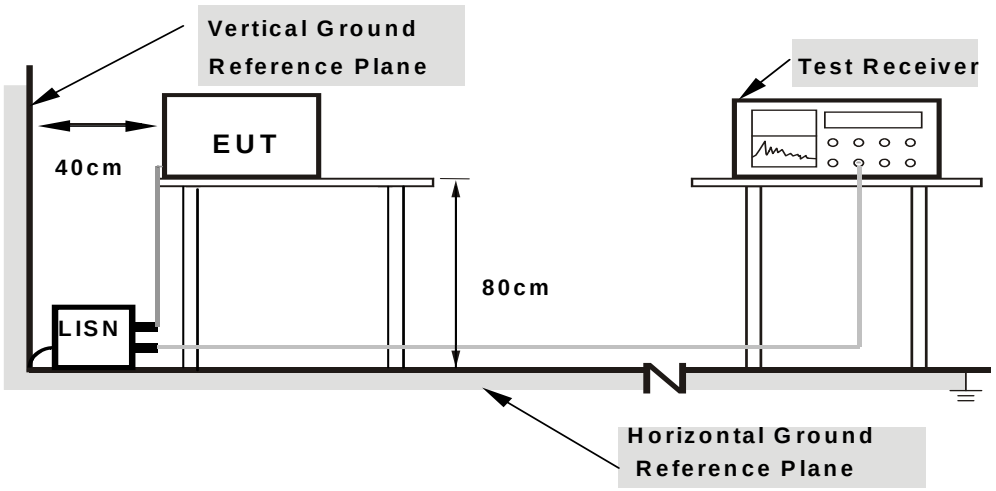
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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 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

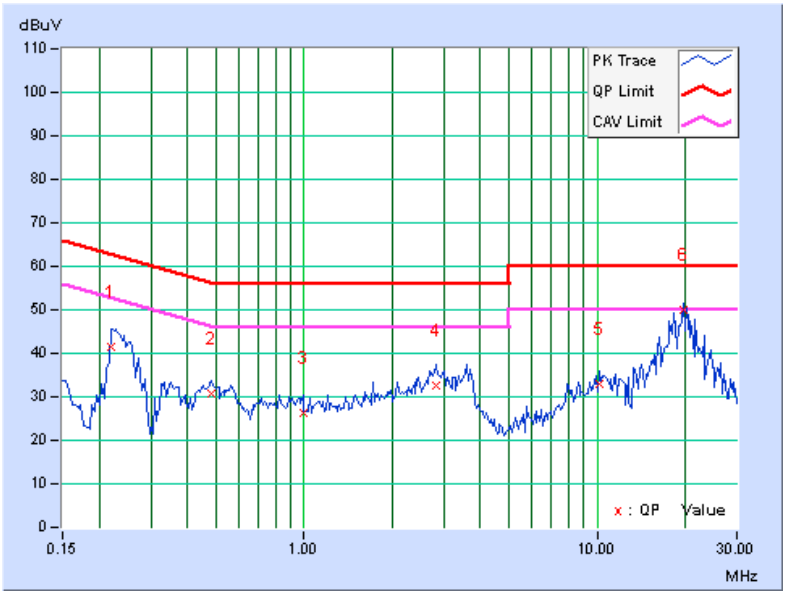
802.11b + 802.11a

CHANNEL	CH 1 + CH 60	6dB BANDWIDTH	9kHz
PHASE	Line 1		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22031	0.17	41.19	21.46	41.36	21.63	62.81	52.81	-21.44	-31.17
2	0.48203	0.22	30.35	21.62	30.57	21.84	56.30	46.30	-25.74	-24.47
3	0.98984	0.27	26.00	16.10	26.27	16.37	56.00	46.00	-29.73	-29.63
4	2.82813	0.32	32.14	22.19	32.46	22.51	56.00	46.00	-23.54	-23.49
5	10.24219	0.44	32.46	28.08	32.90	28.52	60.00	50.00	-27.10	-21.48
6	19.71094	0.63	49.42	46.78	50.05	47.41	60.00	50.00	-9.95	-2.59

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.

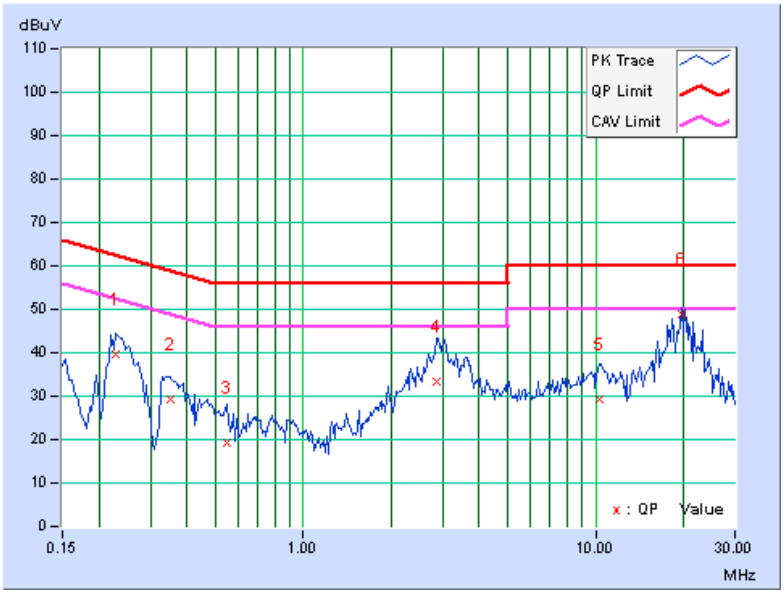


CHANNEL	CH 1 + CH 60	6dB BANDWIDTH	9kHz
PHASE	Line 2		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22812	0.19	39.62	24.67	39.81	24.86	62.52	52.52	-22.71	-27.66
2	0.35313	0.23	28.97	19.68	29.20	19.91	58.89	48.89	-29.68	-28.97
3	0.54844	0.25	18.98	5.14	19.23	5.39	56.00	46.00	-36.77	-40.61
4	2.84766	0.33	32.90	24.13	33.23	24.46	56.00	46.00	-22.77	-21.54
5	10.31250	0.49	28.84	23.52	29.33	24.01	60.00	50.00	-30.67	-25.99
6	19.71094	0.72	48.26	46.27	48.98	46.99	60.00	50.00	-11.02	-3.01

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.



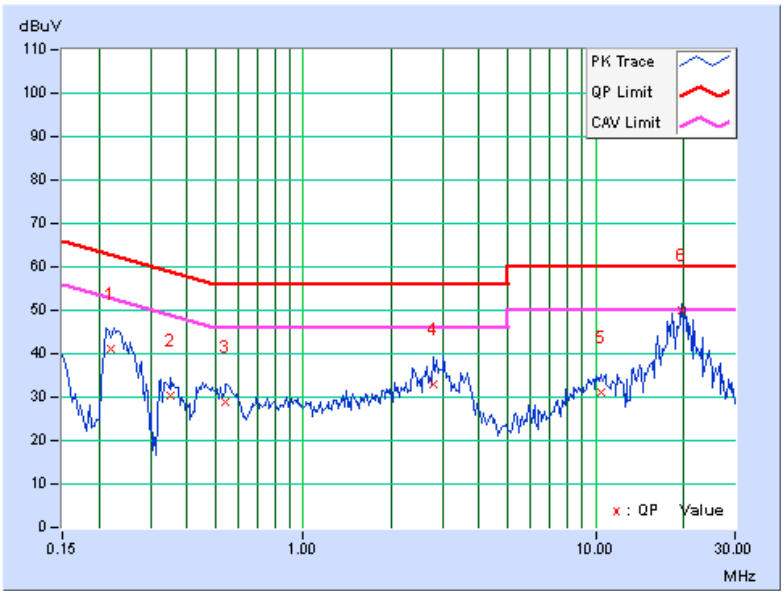
802.11b + 802.11a

CHANNEL	CH 1 + CH 116	**6dB BANDWIDTH**	9kHz
PHASE	Line 1		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22013	0.17	40.87	21.07	41.04	21.24	62.81	52.81	-21.77	-31.57
2	0.35313	0.20	30.14	18.36	30.34	18.56	58.89	48.89	-28.55	-30.33
3	0.54453	0.22	28.85	14.33	29.07	14.55	56.00	46.00	-26.93	-31.45
4	2.79688	0.32	32.66	21.82	32.98	22.14	56.00	46.00	-23.02	-23.86
5	10.48047	0.44	30.53	23.11	30.97	23.55	60.00	50.00	-29.03	-26.45
6	**19.71094**	**0.63**	**49.39**	**47.25**	**50.02**	**47.88**	**60.00**	**50.00**	**-9.98**	**-2.12**

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.

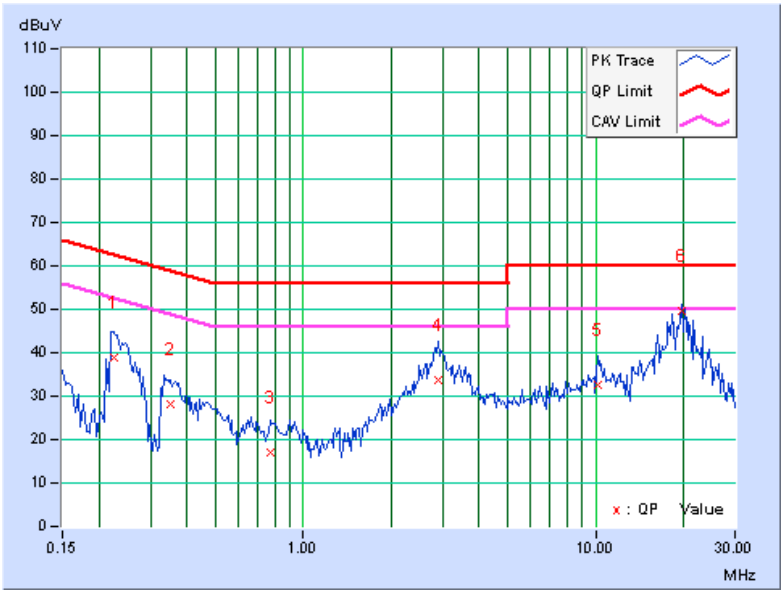


CHANNEL	CH 1 + CH 116	6dB BANDWIDTH	9kHz
PHASE	Line 2		

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22422	0.19	38.75	22.52	38.94	22.71	62.66	52.66	-23.72	-29.95
2	0.35313	0.23	28.09	19.23	28.32	19.46	58.89	48.89	-30.56	-29.42
3	0.77109	0.24	16.96	5.50	17.20	5.74	56.00	46.00	-38.80	-40.26
4	2.90625	0.33	33.32	25.18	33.65	25.51	56.00	46.00	-22.35	-20.49
5	10.24219	0.49	32.26	27.82	32.75	28.31	60.00	50.00	-27.25	-21.69
6	19.71094	0.72	49.03	46.78	49.75	47.50	60.00	50.00	-10.25	-2.50

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.



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: 886-2-26051924

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: 886-3-3270892

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

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

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---