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FCC DoC TEST REPORT

REPORT NO.: FD121009D18

MODEL NO.: 290LM***** – *multiple listing see item 3.1*

RECEIVED: Oct. 9, 2012

TESTED: Oct. 13 ~ 16, 2012

ISSUED: Oct. 30, 2012

APPLICANT: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

ADDRESS: 10F.,No.230,Liancheng Rd.,Zhonghe City, Taipei
County 23553,Taiwan

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

LAB LOCATION: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei
City, Taiwan

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FD121009D18	Original release	Oct. 30, 2012



1 CERTIFICATION

PRODUCT: LCD Monitor

MODEL NO: 290LM***** – *multiple listing see item 3.1*

(The "*" can be any alphanumeric character including blank for marketing differences.)

APPLICANT: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.

TEST ITEM: ENGINEERING SAMPLE

TESTED: Oct. 13 ~ 16, 2012

STANDARDS: FCC Part 15, Subpart B, Class B

ICES-003: 2012, Class B

ANSI C63.4-2009

The above equipment (model no.: Q2963Pm) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY :  , DATE: Oct. 30, 2012
(Vivian Chen / Specialist)

APPROVED BY :  , DATE: Oct. 30, 2012
(Kenny Meng / Assistant Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Remarks
FCC Part 15, Subpart B, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -5.46 dB at 20.20966 MHz
ICES-003: 2012, Class B	Radiated Test (30MHz ~ 10GHz)	PASS	Meets Class B Limit Minimum passing margin is -4.14 dB at 445.51 MHz

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	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz ~ 30MHz	3.46 dB
Radiated emissions	30MHz ~ 1GHz	3.86 dB
	Above 1GHz	3.36 dB

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	LCD Monitor
MODEL NO.	290LM***** – <i>multiple listing see note below</i>
POWER SUPPLY	Switching Power Adapter: Brand: TPV ELECTRONICS(FUJIAN) CO., LTD Model No.: ADPC1965 Rating: AC I/P: 100-240V, 50-60Hz, 1.5A DC O/P: 19V, 3.42A Power Cord Non-shielded AC 3 Pin (1.5m) or (1.2m) Non-shielded DC cable (1.8m) with one ferrite core.
DATA CABLE SUPPLIED	Shielded DVI cable (1.5 m) with two ferrite cores. Shielded D-Sub cable (1.5 m) with two ferrite cores. Shielded Display cable (1.8 m) . Shielded HDMI cable (1.8 m). Shielded Audio cable (1.8 m).

NOTE:

- The EUT is a LCD Monitor with resolution is up to the following specification:
 - ◆ D-Sub / DVI / Display (up to 2560 x 1080, 60Hz)
 - ◆ HDMI (up to 1920 x 1080, 60Hz)
- The EUT has several models, which are identical to each other except for their marketing differences only, as the following:

Model No.	Interfaces	Difference
290LM*****	◆ HDMI in (MHL) ◆ Display in ◆ Display out	Marketing differences
*2963*****	◆ DVI in ◆ D-Sub in ◆ Audio in ◆ Earphone	

(The "*" can be any alphanumeric character including blank for marketing differences.)

During the test, **model: Q2963Pm** was selected as the representative one and therefore only its test data was recorded in this report.

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

3.2 DESCRIPTION OF TEST MODES

1. The EUT was pre-tested the length: 1.2m and 1.5m of the AC cable, and the worst emission level was found under **1.5m**.
2. The EUT is designed with AC power supply of 100-240Vac, 50-60Hz. For radiated emission evaluation, 230Vac/ 50Hz (for EN 55022 & AS/NZS CISPR 22), 120Vac/ 60Hz (for FCC Part 15), 110Vac/ 60Hz & 220Vac/ 60Hz (for BSMI CNS 13438) had been covered during the pre-test. The worst radiated emission data was founded at **110Vac/ 60Hz** and recorded in the applied test report.
3. The EUT was pre-testing other interfaces as the following:

Interface	Resolution
DVI	2560 x 1080 (60Hz)
D-Sub	
Display	
HDMI	1920 x 1200 (60Hz)

The worst emission level was found under the **DVI** interface.

4. According to the pre-test result, the EUT was pre-testing under the following resolution & refresh rate modes:

Interface	Resolution
DVI	2560 x 1080 (60Hz)
	1920 x 1080 (60Hz)
	1680 x 1050 (60Hz)
	1440 x 900 (60Hz)
	1366 x 768 (60Hz)
	1280 x 1024 (75Hz)
	1024 x 768 (75Hz)
	800 x 600 (75Hz)
	640 x 480 (75Hz)
PIP Mode, <DVI + Display, 2560 x 1080 (60Hz)>	
PBP Mode, <DVI + Display, 2560 x 1080 (60Hz)>	
DVD to HDMI	1080p
MHL Link Phone	

The worst radiated emission level was found when EUT tested under **DVI, 2560 x 1080 (60Hz)**.

5. Per above evaluation and client's requirement, the EUT was tested under the following modes:

Test Mode	Interface	Resolution
Mode 1	DVI	2560 x 1080 (60Hz)
Mode 2	DVD to HDMI	1080p

All above test modes were recorded in this report.

3.3 DESCRIPTION OF SUPPORT UNITS

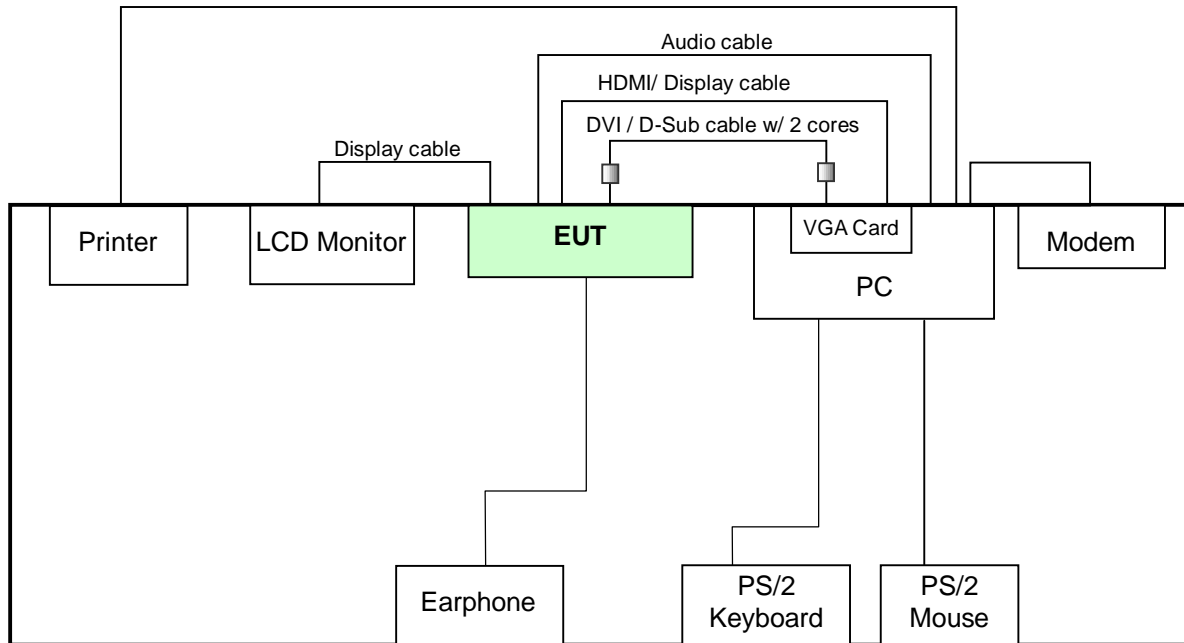
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PERSONAL COMPUTER	HP	6000ProMT	SGH110SGNF	FCC DOC Approved
2	VGA CARD	DELL	X300SE	260629000067	FCC Doc Approved
3	Monitor	PHILIPS	298P4Q	N/A	FCC DoC Approved
4	DVD player (Only Mode 2)	SONY	DVP-NS355	4199874	Verification
5	PRINTER	LEXMARK	Z33	03331652572	FCC DoC Approved
6	MODEM	ACEEX	1414	980020506	IFAXDM1414
7	EARPHONE	PHILIPS	SBC HL150	H2010150	N/A
8	PS/2 KEYBOARD	HP	KB-0316	BC3520DGAVF 050	FCC DoC Approved
9	PS/2 MOUSE	DELL	MS111-P	CN-011D3V-715 81-1CJ-0F8M-A 01	FCC DoC Approved

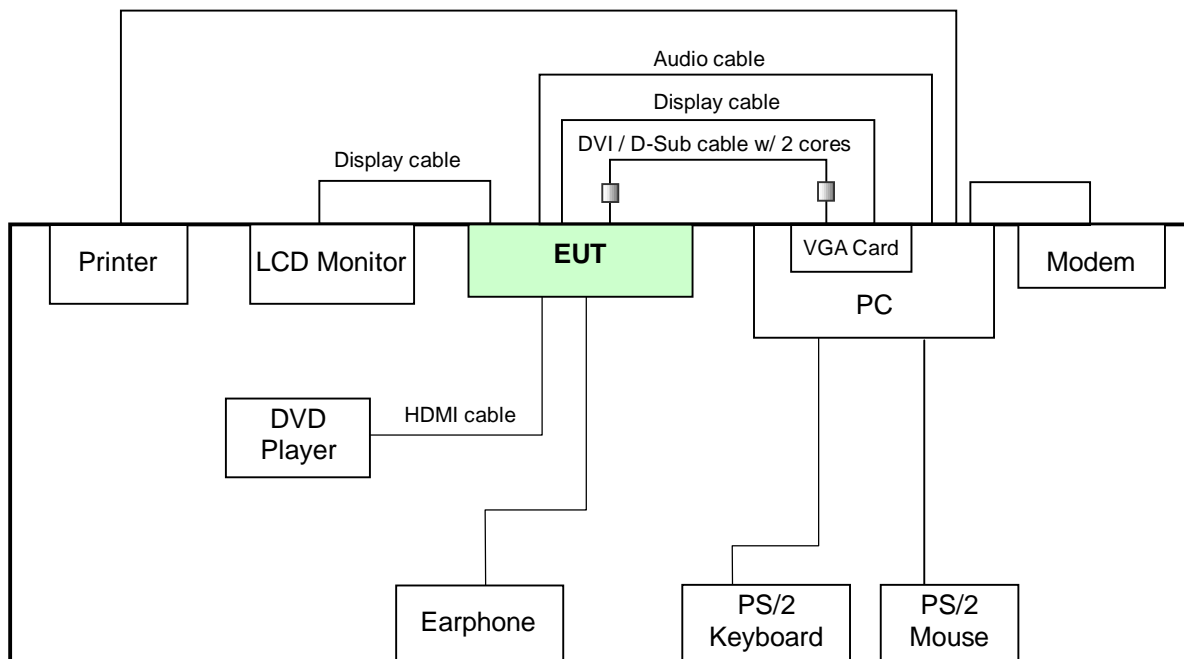
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.5 m shielded DVI cable with two cores; 1.5 m shielded D-Sub cable with two cores; 1.8 m shielded Display cable; 1.8 m shielded HDMI cable; (Only Mode 1) 1.8 m shielded Audio cable
2	N/A
3	1.8 m shielded Display cable
4	1.8 m shielded HDMI cable
5	2.0 m foil shielded wire, terminated with USB connector via metallic frame, w/o core.
6	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
7	1.2 m wrapped shielded wire, terminated with 3.5mm phone plug via drain wire, w/o core.
8	1.8 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
9	1.8 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.

NOTE: (1) All power cords of the above support units are non-shielded (1.8 m).
 (2) The support unit 2 was installed in support unit 1.
 (3) The support unit 3 was provided by client.

TEST CONFIGURATION – Mode 1



TEST CONFIGURATION – Mode 2



4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

TEST STANDARD:

FCC Part 15, Subpart B (Section: 15.107)

ICES-003:2012 Issue 5 (section: 6.1)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	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.



4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	834115/016	Apr. 13, 2012	Apr. 12, 2013
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ESH2-Z5	828075/003	Sep. 05, 2012	Sep. 04, 2013
LISN With Adapter (for EUT)	AD10	C03Ada-001	Aug. 29, 2012	Aug. 28, 2013
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 16, 2012	Jul. 15, 2013
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C03.01	Jan. 08, 2012	Jan. 07, 2013
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 30, 2012	Jan. 29, 2013
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Feb. 10, 2012	Feb. 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. The test was performed in Shielded Room No. 3.
 3. The VCCI Site Registration No. C-274.
 4. Tested Date: Oct. 13, 2012

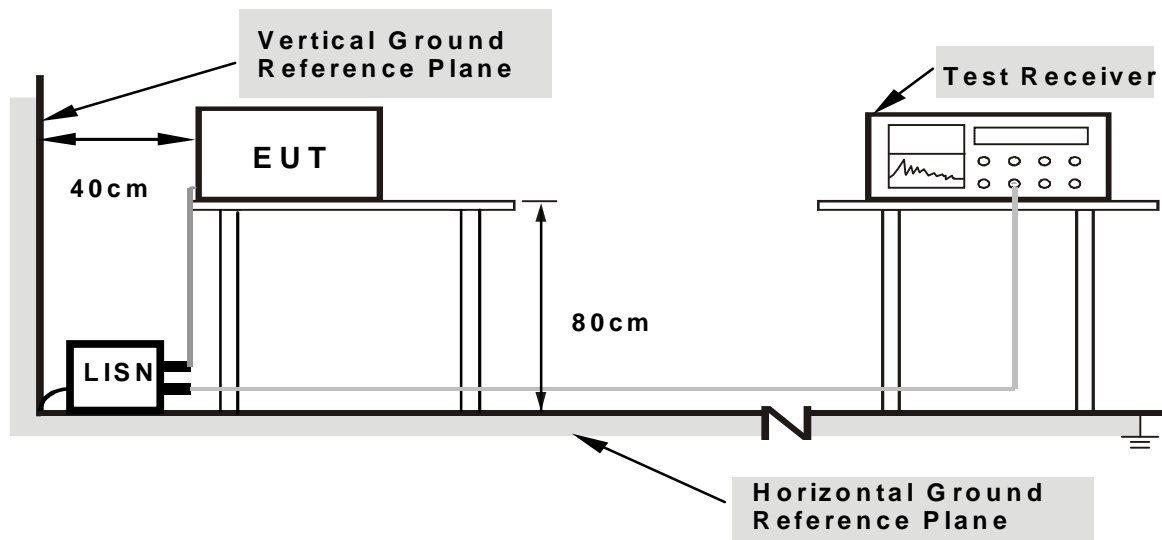
4.1.3 TEST PROCEDURE

- 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 150 kHz to 30 MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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

4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. PC ran a test program (WinFCC) to enable all functions.
- c. PC read and wrote messages from HDD.
- d. PC sent “H” messages to EUT, and then it displayed “H” patterns on its screen. **(For Mode 1)**
- e. PC sent “H” messages to ext. monitor via EUT, and then it displayed “H” patterns on its screen. **(For Mode 1)**
- f. DVD player sent video messages to EUT, and then it displayed video messages on its screen. **(For Mode 2)**
- g. DVD player sent video messages to ext. monitor via EUT, and then it displayed video messages on its screen. **(For Mode 2)**
- h. PC sent messages to printer and printer printed them out.
- i. PC sent messages to modem.
- j. PC/ DVD player sent “1kHz audio signal” to earphone via EUT.
- k. Steps c-k were repeated.

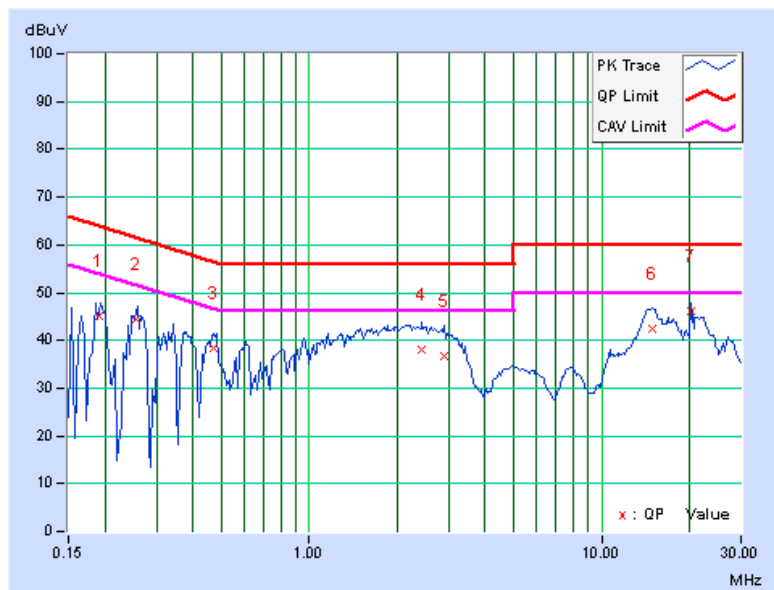
4.1.7 TEST RESULTS (1)

TEST MODE	Mode 1	6DB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	23deg. C, 74% RH	TESTED BY: Tim Chen	

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	0.19042	0.31	44.76	34.58	45.07	34.89	64.02	54.02	-18.95	-19.13
2	0.25428	0.33	44.22	34.38	44.55	34.71	61.62	51.62	-17.07	-16.91
3	0.47031	0.34	37.92	23.59	38.26	23.93	56.51	46.51	-18.24	-22.57
4	2.42969	0.49	37.68	25.74	38.17	26.23	56.00	46.00	-17.83	-19.77
5	2.90234	0.53	36.31	25.81	36.84	26.34	56.00	46.00	-19.16	-19.66
6	14.91406	1.17	41.39	35.61	42.56	36.78	60.00	50.00	-17.44	-13.22
7	20.20966	1.50	44.64	43.04	46.14	44.54	60.00	50.00	-13.86	-5.46

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.

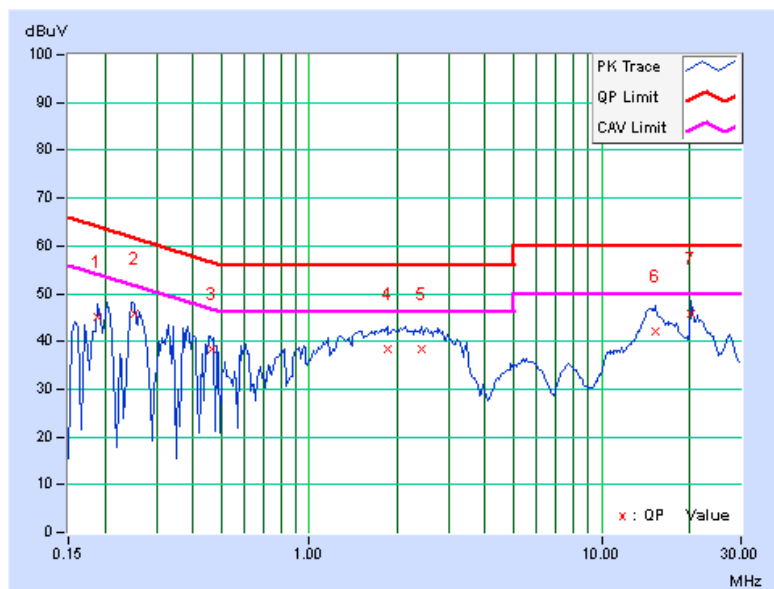


TEST MODE	Mode 1	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	23deg. C, 74% RH	TESTED BY: Tim Chen	

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	0.18949	0.26	44.76	34.18	45.02	34.44	64.06	54.06	-19.04	-19.62
2	0.25156	0.28	45.53	35.70	45.81	35.98	61.71	51.71	-15.90	-15.73
3	0.46495	0.29	38.15	23.97	38.44	24.26	56.60	46.60	-18.16	-22.34
4	1.84766	0.40	37.95	25.89	38.35	26.29	56.00	46.00	-17.65	-19.71
5	2.41016	0.44	37.92	26.67	38.36	27.11	56.00	46.00	-17.64	-18.89
6	15.28906	1.03	40.92	35.00	41.95	36.03	60.00	50.00	-18.05	-13.97
7	20.21094	1.26	44.38	42.53	45.64	43.79	60.00	50.00	-14.36	-6.21

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



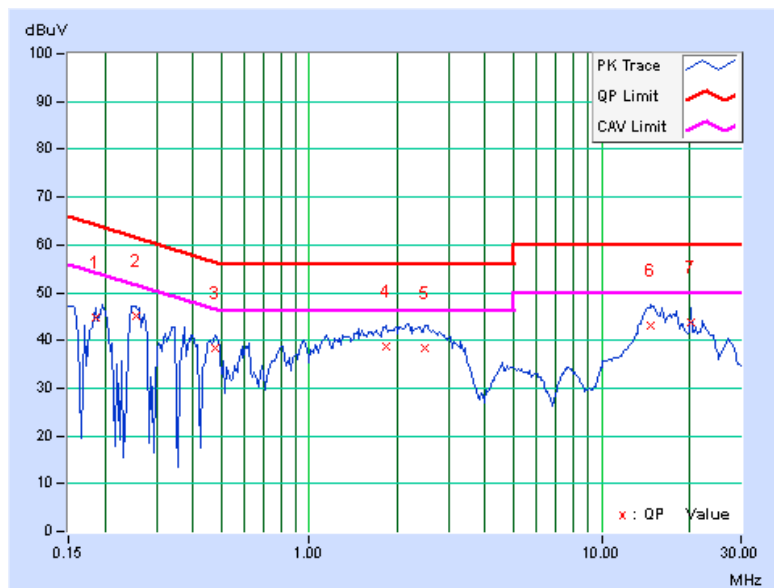
4.1.8 TEST RESULTS (2)

TEST MODE	Mode 2	6DB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	23deg. C, 74% RH	TESTED BY: Tim Chen	

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	0.18518	0.31	44.53	32.52	44.84	32.83	64.25
2	0.25547	0.33	44.69	34.76	45.02	35.09	61.58	51.58	-16.56	-16.49
3	0.47422	0.34	38.12	23.22	38.46	23.56	56.44	46.44	-17.97	-22.87
4	1.83203	0.45	38.22	25.54	38.67	25.99	56.00	46.00	-17.33	-20.01
5	2.47266	0.50	37.89	26.86	38.39	27.36	56.00	46.00	-17.61	-18.64
6	14.78906	1.16	42.04	36.37	43.20	37.53	60.00	50.00	-16.80	-12.47
7	20.21484	1.50	42.42	40.21	43.92	41.71	60.00	50.00	-16.08	-8.29

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.

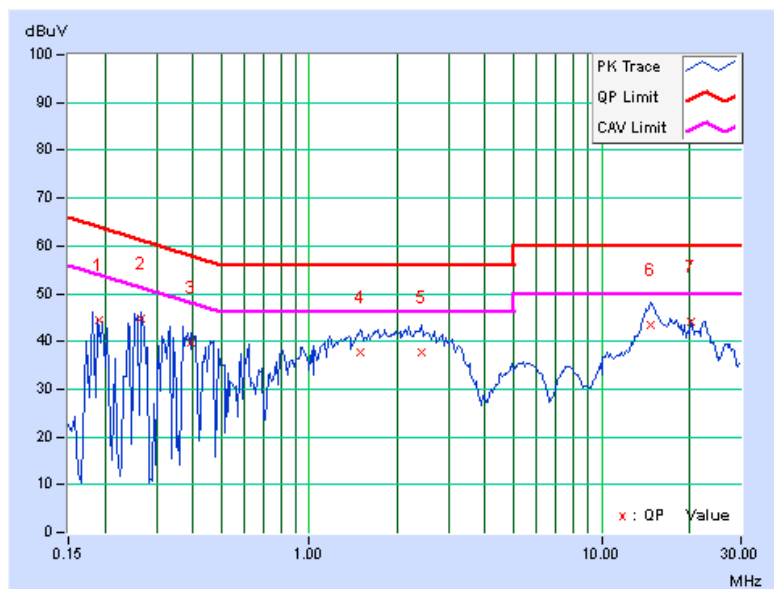


TEST MODE	Mode 2	6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	23deg. C, 74% RH	TESTED BY: Tim Chen	

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	0.19015	0.26	44.32	33.98	44.58	34.24	64.03	54.03	-19.45	-19.79
2	0.26719	0.28	44.51	33.44	44.79	33.72	61.20	51.20	-16.42	-17.49
3	0.39609	0.29	39.47	26.45	39.76	26.74	57.93	47.93	-18.18	-21.20
4	1.50000	0.37	37.32	24.08	37.69	24.45	56.00	46.00	-18.31	-21.55
5	2.43750	0.45	37.13	25.53	37.58	25.98	56.00	46.00	-18.42	-20.02
6	14.73438	1.01	42.26	36.43	43.27	37.44	60.00	50.00	-16.73	-12.56
7	20.21484	1.26	42.69	40.43	43.95	41.69	60.00	50.00	-16.05	-8.31

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 EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD:

FCC Part 15, Subpart B (Section: 15.109)

ICES-003:2012 Issue 5 (section: 6.2)

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

Radiated Emissions Limits at 10 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B/ ICES-003, Class A	FCC 15B/ ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5	Not defined	Not defined
1000-3000	Avg: 49.5	Avg: 43.5		
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

Radiated Emissions Limits at 3 meters (dB μ V/m)				
Frequencies (MHz)	FCC 15B/ ICES-003, Class A	FCC 15B/ ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54	Avg: 56 Peak: 76	Avg: 50 Peak: 70
1000-3000	Avg: 60	Avg: 54		
Above 3000	Peak: 80	Peak: 74	Avg: 60 Peak: 80	Avg: 54 Peak: 74

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (μ V/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. QP detector shall be applied if not specified.

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower



4.2.2 TEST INSTRUMENTS

Frequency Range 30MHz~1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ TEST RECEIVER	ESCS30	847793/022	May. 28, 2012	May. 27, 2013
CHASE BILOG Antenna	CBL6111C	2765	Apr. 06, 2012	Apr. 05, 2013
CT Turn Table	TT100	CT-0055	NA	NA
CT Tower	AT100	CT-0055	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
ADT RF Switches BOX	EMH-011	08005	Jun. 21, 2012	Jun. 20, 2013
WOKEN RF cable	8D	CABLE-ST6-01	Jun. 21, 2012	Jun. 20, 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 test was performed in Open Site No. 6.
 3. The VCCI Site Registration No. R-728.
 4. The FCC Site Registration No. 90427.
 5. Tested Date: Oct. 15, 2012

Frequency Range above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum	E4446A	MY51100009	Jun. 26, 2012	Jun. 25, 2013
EMCI Preamplifier	EMC0126545	980076	Mar. 01, 2012	Feb. 28, 2013
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 02, 2012	Mar. 01, 2013
Schwarzbeck Horn Antenna	BBHA-9170	BBHA9170190	Oct. 04, 2012	Oct. 03, 2013
EMCO Horn Antenna	3115	6714	Oct. 24, 2011	Oct. 23, 2012
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
SUHNER RF cable	SF106-18	Cable-CH10	Aug. 19, 2012	Aug. 18, 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 test was performed in Chamber No. 10.
 3. The Industry Canada Reference No. IC 7450E-11.
 4. The VCCI Site Registration No. G427
 5. The FCC Site Registration No. 367016
 6. Tested Date: Oct. 16, 2012

4.2.3 TEST PROCEDURE

<Frequency Range 30MHz ~ 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 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 turn 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.

NOTE: The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber room. 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 can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect 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 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 and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

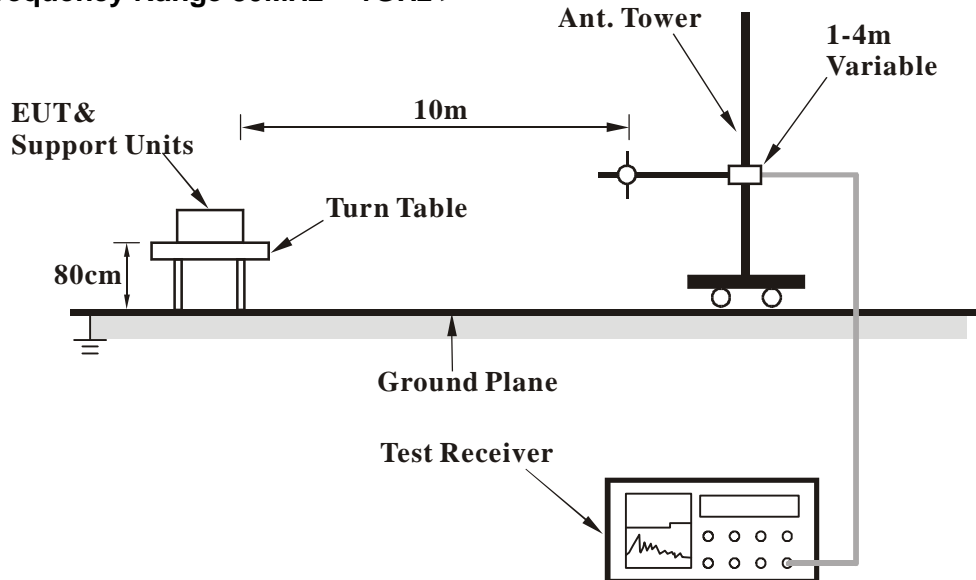
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.

4.2.4 DEVIATION FROM TEST STANDARD

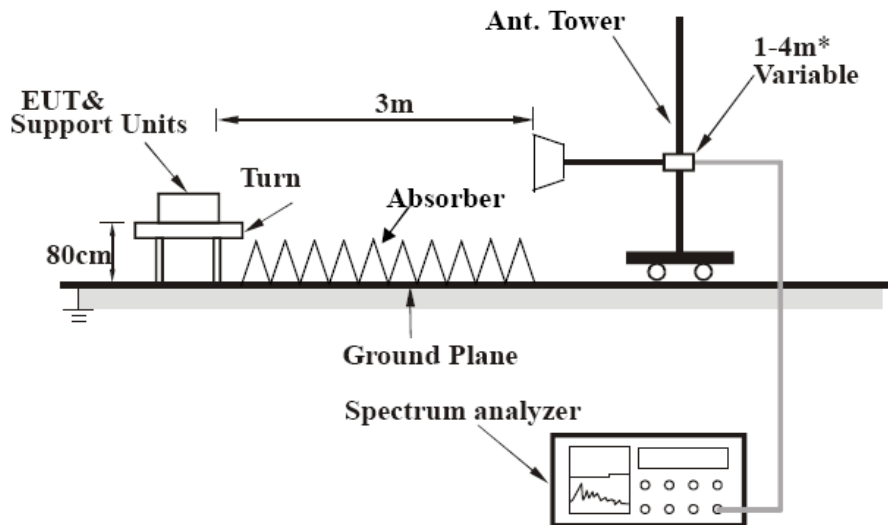
No deviation

4.2.5 TEST SETUP

<Frequency Range 30MHz ~ 1GHz >



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 8.3.2.2 of ANSI C63.4: 2009.

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

4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6

4.2.7 TEST RESULTS (1)

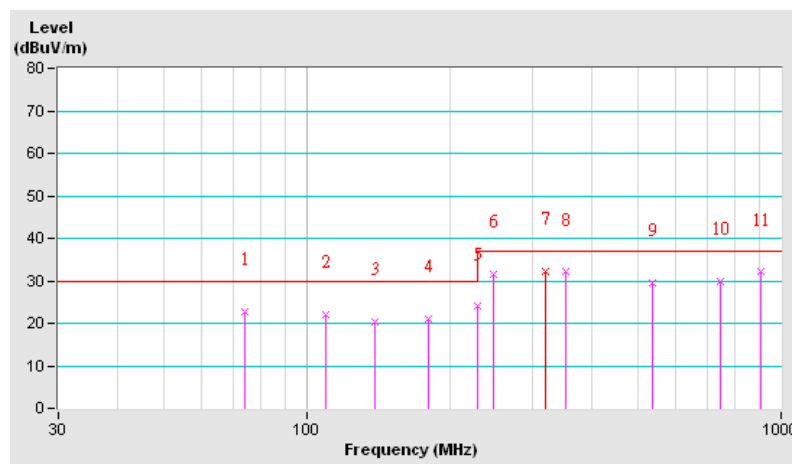
TEST MODE	Mode 1		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 70% RH,	TESTED BY: Vhenson Huang	

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	74.26	22.66 QP	30.00	-7.34	4.00 H	137	14.36	8.30
2	109.70	22.16 QP	30.00	-7.84	4.00 H	305	9.49	12.67
3	139.78	20.32 QP	30.00	-9.68	4.00 H	352	6.88	13.44
4	181.28	21.03 QP	30.00	-8.97	4.00 H	99	9.95	11.08
5	228.88	23.96 QP	30.00	-6.04	4.00 H	327	10.28	13.68
6	248.01	31.53 QP	37.00	-5.47	2.58 H	94	16.31	15.22
7	318.70	32.36 QP	37.00	-4.64	2.90 H	268	15.26	17.10
8	352.44	32.04 QP	37.00	-4.96	2.54 H	194	13.70	18.34
9	536.42	29.45 QP	37.00	-7.55	2.08 H	325	3.35	26.10
10	743.45	29.75 QP	37.00	-7.25	1.14 H	82	1.42	28.33
11	908.17	32.07 QP	37.00	-4.93	1.00 H	192	1.25	30.82

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.



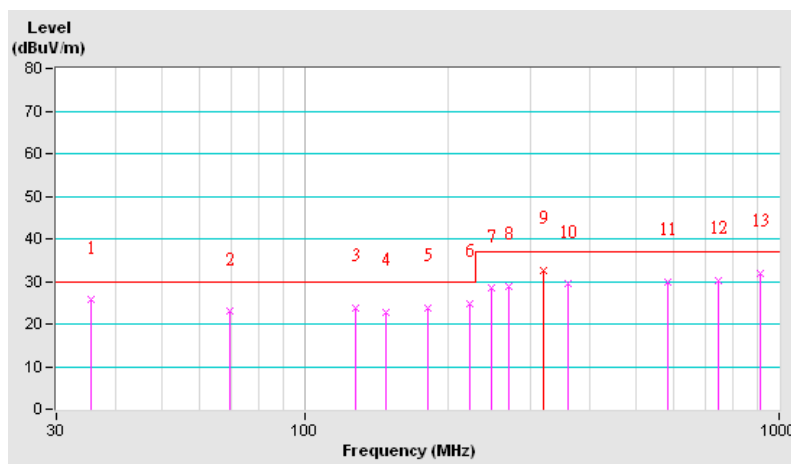
TEST MODE	Mode 1		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 70% RH,	TESTED BY: Vhenson Huang	

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	35.59	25.64 QP	30.00	-4.36	1.36 V	317	9.16	16.48
2	69.73	22.93 QP	30.00	-7.07	1.26 V	199	15.03	7.90
3	128.15	23.86 QP	30.00	-6.14	1.00 V	291	10.31	13.55
4	148.33	22.73 QP	30.00	-7.27	1.00 V	159	9.73	13.00
5	182.28	23.66 QP	30.00	-6.34	1.00 V	195	12.56	11.10
6	222.43	24.72 QP	30.00	-5.28	1.00 V	38	11.56	13.16
7	247.63	28.37 QP	37.00	-8.63	1.00 V	224	13.18	15.19
8	268.80	28.82 QP	37.00	-8.18	1.00 V	154	13.06	15.76
9	318.70	32.65 QP	37.00	-4.35	1.00 V	13	15.55	17.10
10	358.00	29.37 QP	37.00	-7.63	1.00 V	203	10.83	18.54
11	583.70	29.83 QP	37.00	-7.17	2.47 V	283	3.64	26.19
12	743.50	30.18 QP	37.00	-6.82	1.85 V	111	1.85	28.33
13	910.26	31.87 QP	37.00	-5.13	2.52 V	310	1.01	30.86

REMARKS:

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

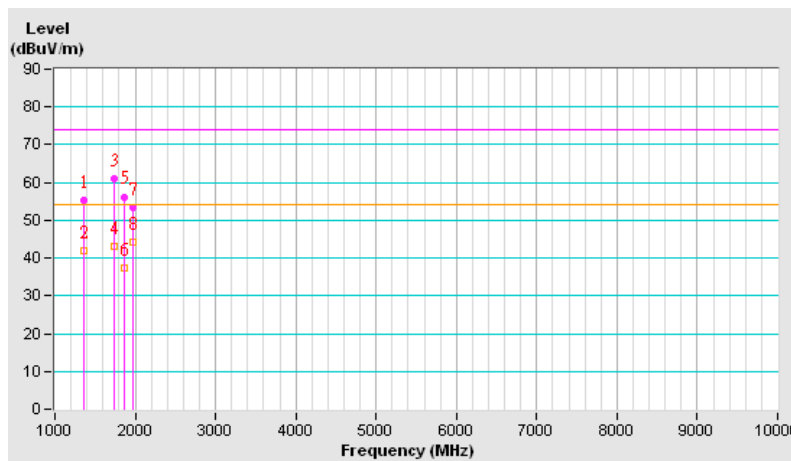


TEST MODE	Mode 1		
FREQUENCY RANGE	1-10 GHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	18deg. C, 66% RH,	TESTED BY: Nick Hsu	

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	1359.26	55.41 PK	74.00	-18.59	1.45 H	226	27.84	27.57
2	1359.26	41.91 AV	54.00	-12.09	1.45 H	226	14.34	27.57
3	1745.34	60.96 PK	74.00	-13.04	1.15 H	230	31.59	29.37
4	1745.34	43.04 AV	54.00	-10.96	1.15 H	230	13.67	29.37
5	1863.55	56.21 PK	74.00	-17.79	1.04 H	242	26.21	30.00
6	1863.55	37.28 AV	54.00	-16.72	1.04 H	242	7.28	30.00
7	1980.54	53.28 PK	74.00	-20.72	1.02 H	234	22.68	30.60
8	1980.54	44.12 AV	54.00	-9.88	1.02 H	234	13.52	30.60

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.

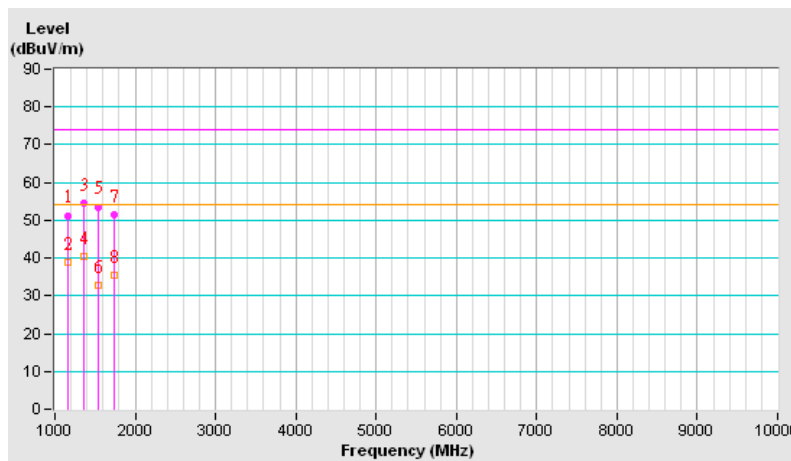


TEST MODE	Mode 1		
FREQUENCY RANGE	1-10 GHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	18deg. C, 66% RH,	TESTED BY: Nick Hsu	

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	1166.88	51.29 PK	74.00	-22.71	1.26 V	29	24.47	26.82
2	1166.88	38.76 AV	54.00	-15.24	1.26 V	29	11.94	26.82
3	1359.39	54.57 PK	74.00	-19.43	1.05 V	217	27.00	27.57
4	1359.39	40.26 AV	54.00	-13.74	1.05 V	217	12.69	27.57
5	1538.85	53.58 PK	74.00	-20.42	1.01 V	305	25.28	28.30
6	1538.85	32.94 AV	54.00	-21.06	1.01 V	305	4.64	28.30
7	1745.77	51.59 PK	74.00	-22.41	1.35 V	168	22.22	29.37
8	1745.77	35.28 AV	54.00	-18.72	1.35 V	168	5.91	29.37

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.



4.2.8 TEST RESULTS (2)

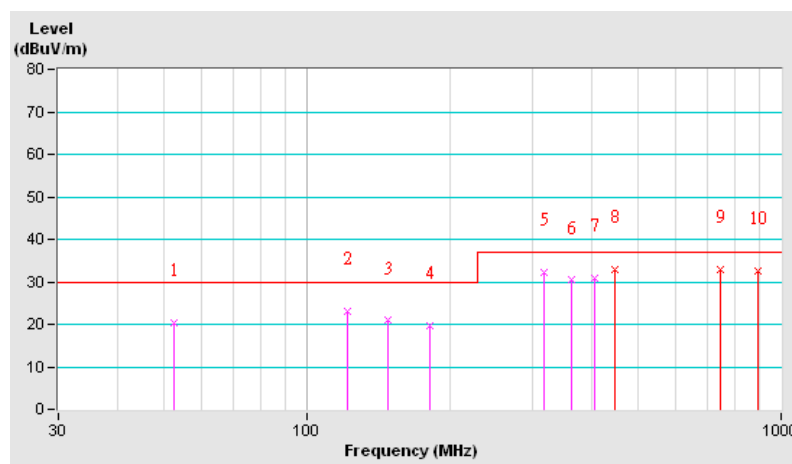
TEST MODE	Mode 2		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 70% RH,	TESTED BY: Vhenson Huang	

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	52.62	20.50 QP	30.00	-9.50	4.00 H	0	10.48	10.02
2	121.65	23.08 QP	30.00	-6.92	4.00 H	124	9.46	13.62
3	148.64	20.90 QP	30.00	-9.10	4.00 H	261	7.92	12.98
4	181.59	19.78 QP	30.00	-10.22	4.00 H	265	8.69	11.09
5	317.60	32.22 QP	37.00	-4.78	4.00 H	348	15.16	17.06
6	362.10	30.39 QP	37.00	-6.61	4.00 H	286	11.70	18.69
7	405.01	30.85 QP	37.00	-6.15	3.26 H	222	10.50	20.35
8	445.51	32.86 QP	37.00	-4.14	1.87 H	233	10.13	22.73
9	742.51	32.81 QP	37.00	-4.19	1.33 H	263	4.49	28.32
10	891.00	32.65 QP	37.00	-4.35	1.00 H	223	2.17	30.48

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.

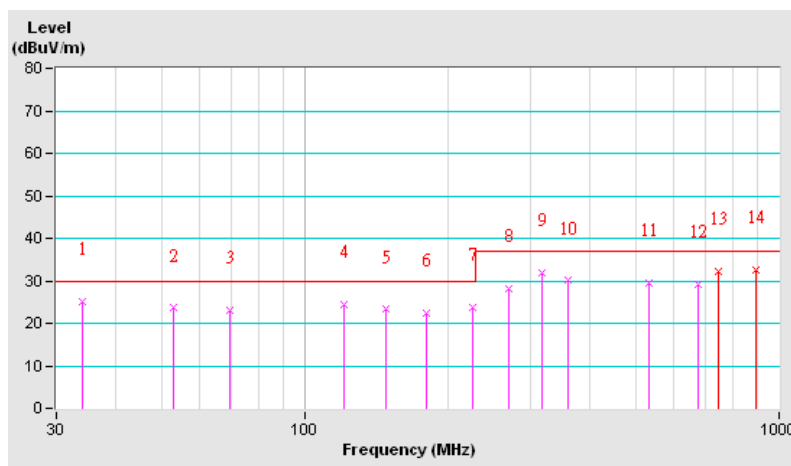


TEST MODE	Mode 2		
FREQUENCY RANGE	30-1000 MHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 70% RH,	TESTED BY: Vhenson Huang	

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	33.99	25.03 QP	30.00	-4.97	1.00 V	250	7.78	17.25
2	53.08	23.62 QP	30.00	-6.38	1.42 V	37	13.79	9.83
3	69.68	23.04 QP	30.00	-6.96	1.28 V	140	15.14	7.90
4	121.43	24.42 QP	30.00	-5.58	1.00 V	100	10.80	13.62
5	148.50	23.27 QP	30.00	-6.73	1.00 V	220	10.28	12.99
6	181.27	22.43 QP	30.00	-7.57	1.00 V	162	11.35	11.08
7	225.35	23.76 QP	30.00	-6.24	1.00 V	69	10.36	13.40
8	268.80	28.09 QP	37.00	-8.91	1.00 V	192	12.33	15.76
9	316.80	32.03 QP	37.00	-4.97	1.00 V	357	15.00	17.03
10	358.00	30.01 QP	37.00	-6.99	1.00 V	23	11.47	18.54
11	533.10	29.50 QP	37.00	-7.50	2.83 V	184	3.42	26.08
12	675.90	29.18 QP	37.00	-7.82	2.44 V	299	1.64	27.54
13	742.51	32.19 QP	37.00	-4.81	3.85 V	3	3.87	28.32
14	891.00	32.62 QP	37.00	-4.38	2.23 V	222	2.14	30.48

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.

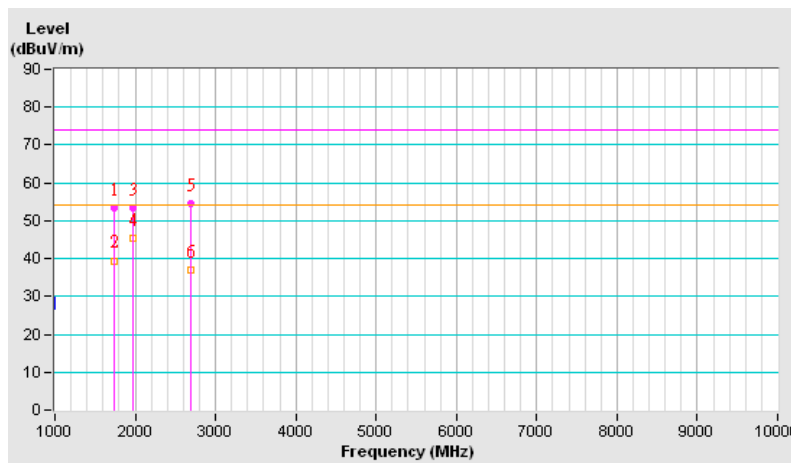


TEST MODE	Mode 2		
FREQUENCY RANGE	1-10 GHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	18deg. C, 66% RH,	TESTED BY: Nick Hsu	

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	1745.50	53.40 PK	74.00	-20.60	1.46 H	226	24.03	29.37
2	1745.50	39.47 AV	54.00	-14.53	1.46 H	226	10.10	29.37
3	1980.43	53.28 PK	74.00	-20.72	1.00 H	246	22.68	30.60
4	1980.43	45.26 AV	54.00	-8.74	1.00 H	246	14.66	30.60
5	2699.70	54.51 PK	74.00	-19.49	1.30 H	141	21.63	32.88
6	2699.70	36.88 AV	54.00	-17.12	1.30 H	141	4.00	32.88

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.

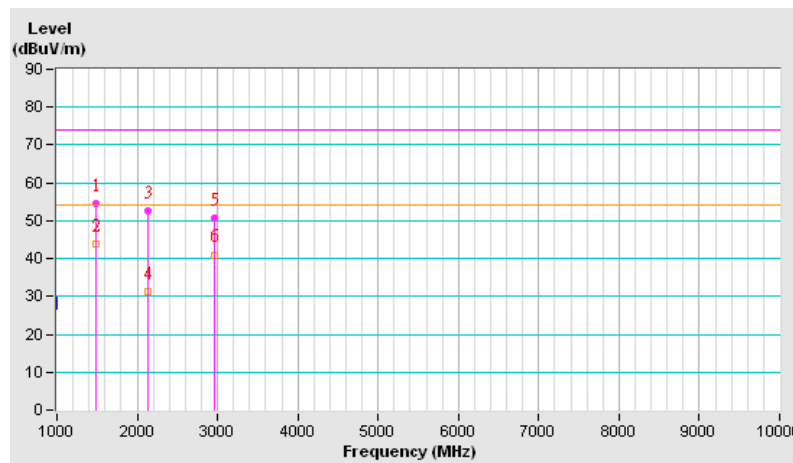


TEST MODE	Mode 2		
FREQUENCY RANGE	1-10 GHz	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Peak/Average, 1MHz
ENVIRONMENTAL CONDITIONS	18deg. C, 66% RH,	TESTED BY: Nick Hsu	

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	1485.05	54.40 PK	74.00	-19.60	1.20 V	179	26.36	28.04
2	1485.05	43.99 AV	54.00	-10.01	1.20 V	179	15.95	28.04
3	2129.92	52.59 PK	74.00	-21.41	1.19 V	183	21.57	31.02
4	2129.92	31.40 AV	54.00	-22.60	1.19 V	183	0.38	31.02
5	2967.12	50.75 PK	74.00	-23.25	1.00 V	205	16.72	34.03
6	2967.12	40.97 AV	54.00	-13.03	1.00 V	205	6.94	34.03

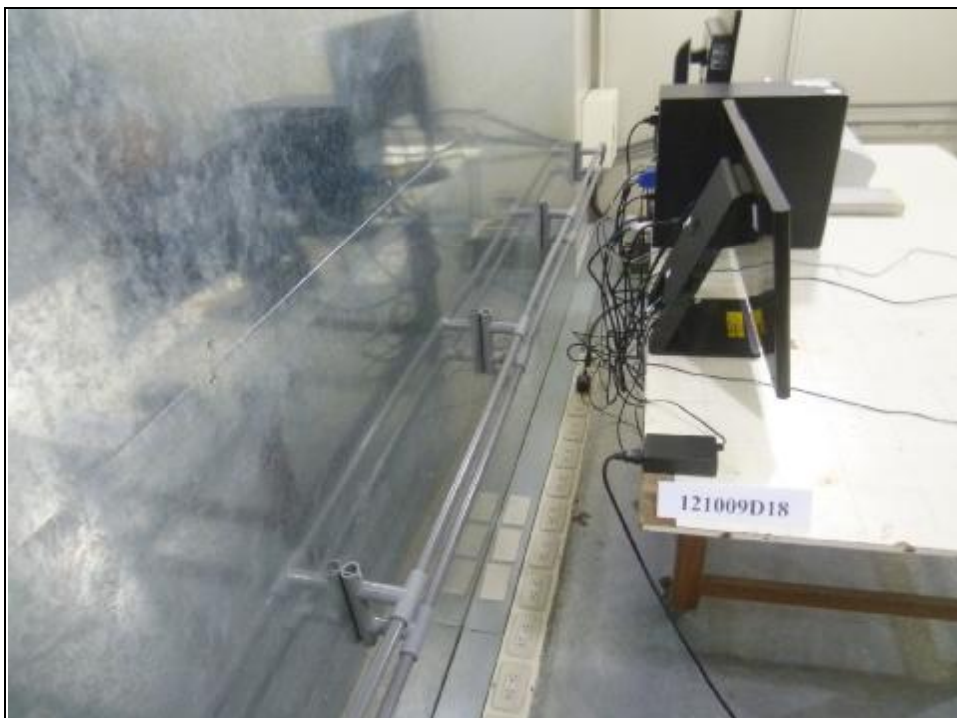
REMARKS:

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.

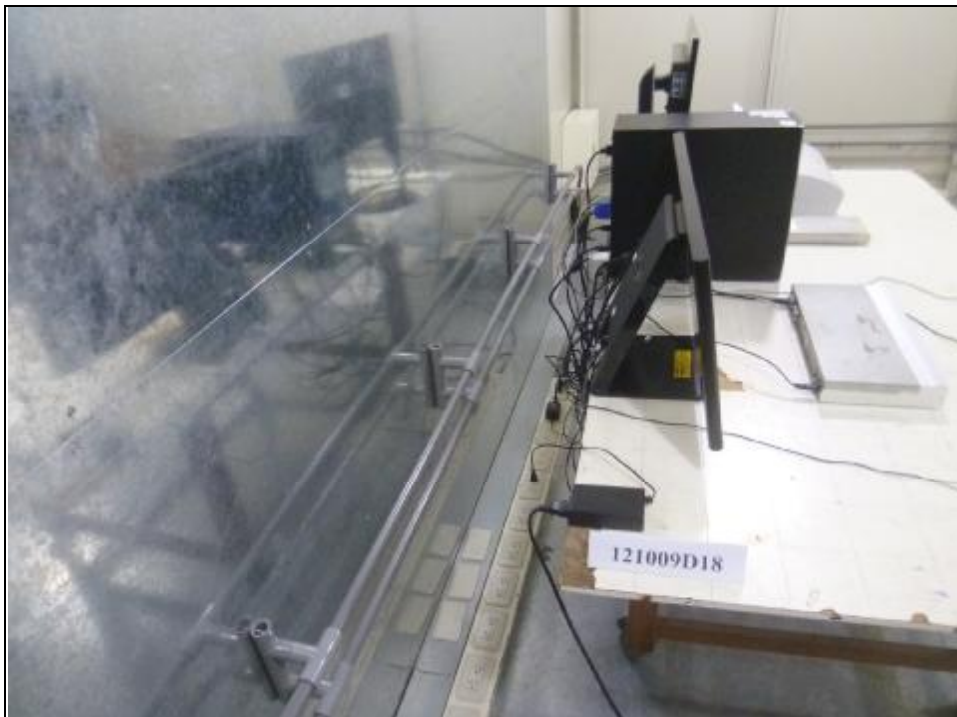


5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST – For Mode 1



CONDUCTED EMISSION TEST – For Mode 2



RADIATED EMISSION TEST – For Mode 1 (Frequency Range 30MHz ~ 1GHz)



RADIATED EMISSION TEST – For Mode 1 (Frequency Range above 1GHz)



RADIATED EMISSION TEST – For Mode 2 (Frequency Range 30MHz ~ 1GHz)



RADIATED EMISSION TEST – For Mode 2 (Frequency Range above 1GHz)





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.tw

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---