FCC TEST REPORT
(RFID)

REPORT NO.:	RF120719E01
MODEL NO.:	C150 W, C150 R, C150 U, C150LW, C150LR, C150LU
FCC ID:	MQT-C150
RECEIVED:	July 19, 2012
TESTED:	July 25 to Aug. 17, 2012
ISSUED:	Aug. 24, 2012

APPLICANT:	XAC AUTOMATION CORP.
ADDRESS:	4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL PARK,HSINCHU,TAIWAN

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120719E01	Original release	Aug. 24, 2012

1 CERTIFICATION

PRODUCT :	Contactless card reader
BRAND NAME :	XAC
MODEL NO. :	C150 W, C150 R, C150 U, C150LW, C150LR, C150LU
TEST SAMPLE :	ENGINEERING SAMPLE
APPLICANT :	XAC AUTOMATION CORP.
TESTED :	July 25 to Aug. 17, 2012
STANDARDS :	FCC Part 15, Subpart C (Section 15.225) FCC Part 15, Subpart C (Section 15.215) ANSI C63.10-2009

The above equipment (Model: C150LW, C150LR, C150LU) have 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:** *Aug. 24, 2012*
(Midoli Peng, Specialist)

APPROVED BY : _____ , **DATE:** *Aug. 24, 2012*
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.225, 15.215)			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	Conducted emission test	PASS	Meet the requirement of limit. Minimum passing margin is -10.97dB at 0.19297MHz.
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	PASS	Meet the requirement of limit. Minimum passing margin is -39.5dB at 13.56MHz
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	PASS	Meet the requirement of limit. Minimum passing margin is -3.7dB at 302.49MHz
15.225 (e)	The frequency tolerance	PASS	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted Emission	2.98 dB
Radiated emissions	5.69 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Contactless card reader
MODEL NO.	C150 W, C150 R, C150 U, C150LW, C150LR, C150LU
POWER SUPPLY	DC 5V from power adapter or DC 5V from host equipment
MODULATION TYPE	ASK
OPERATING FREQUENCY	13.56MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Please see NOTE
DATA CABLE	USB cable (Shielded, 1.3m with 1 core) RS232 cable (Shielded, 1.3m with 1 core) Wayne cable (Shielded, 0.8m with 1 core)
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter (Option) x1

NOTE:

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

Brand name	Model No.	Polarity	Interface
XAC	C150 W	Portrait Orientation	Wayne Cable
	C150 R		RS232
	C150 U		USB
	C150LW	Landscape Orientation	Wayne Cable
	C150LR		RS232
	C150LU		USB

From the above Model numbers, Model: C150 U & C150LU & C150LR & C150 W were selected for pretest modes.

2. The EUT has two kinds of mounting as the following table:

Type	Name
1	Front Mounting
2	Rear Mounting

3. The EUT was pre-tested under following test modes:

Pretest mode	Model No.	Polarity	Interface
Mode A	C150 U	Portrait Orientation	USB
Mode B	C150LU	Landscape Orientation	USB
Mode C	C150LR	Landscape Orientation	RS232
Mode D	C150LW	Landscape Orientation	Wayne Cable

For the above modes, the worse case (Below 30MHz) was found in **Mode C** and the worse case (Above 30MHz) was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

4. The EUT must be supplied with power adapter (Option)as following table:

Brand	Model No.	Spec.
HON-KWANG	HK-UA-050A100-US	Input: 100-240V, 0.2A, 50/60Hz Output: 5V, 1A DC output cable (unshielded, 1.9m)

5. The antenna provided to the EUT, please refer to the following table:

Brand	Model	Antenna Type	Gain(dBi) Include cable loss	Frequency Range (MHz to MHz)	Antenna Connector
XAC	PCB ENIG ANT BOARD C150(ROHS)	PCB (2 Layer)	13	13.56	NA

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

3.2 DESCRIPTION OF TEST MODES

The EUT only has 1 channel.

CHANNEL	FREQUENCY (MHz)
1	13.56

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE (Below 30MHz)	RE (Above 30MHz)	FS	BW	
1	√	-	√	-	-	Model : C150LU
2	√	√	-	√	√	Model : C150LR
3	√	-	-	-	-	Model : C150LW

Where **RE:** Radiated Emission **PLC:** Power Line Conducted Emission
FS: Frequency Stability **BW:** 20dB Bandwidth
NOTE: "-"means no effect.

POWER LINE CONDUCTED EMISSION TEST:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1 ~ 3	1	1	ASK

RADIATED EMISSION TEST(BELOW 30MHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
2	1	1	ASK

RADIATED EMISSION TEST(ABOVE 30MHz):

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	1	ASK

FREQUENCY STABILITY:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
2	1	1	ASK

20dB BANDWIDTH:

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

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
2	1	1	ASK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	23deg. C, 65%RH	120Vac, 60Hz	Kyle Huang
RE	22deg. C, 65%RH	120Vac, 60Hz	Frank Liu
BW	25deg. C, 60%RH	120Vac, 60Hz	Wen Yu
FS	25deg. C, 60%RH	120Vac, 60Hz	Wen Yu

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.225)
FCC Part 15, Subpart C (15.215)
ANSI C63.10-2009

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

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

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.

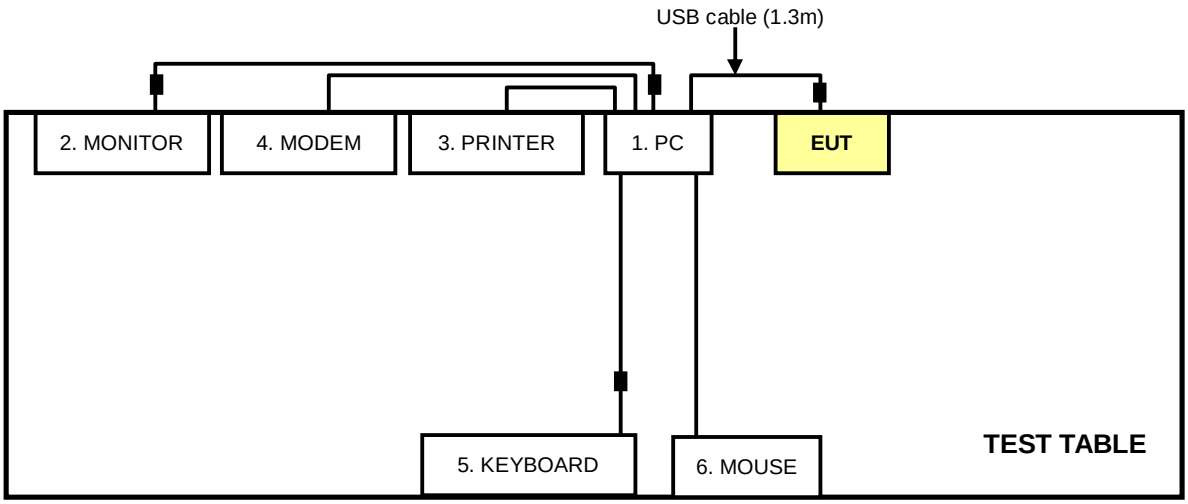
Conducted Emission test					
No.	**Product**	**Brand**	**Model No.**	**Serial No.**	**FCC ID**
1	PERSONAL COMPUTER	DELL	DCSCMF	9KKB32S	FCC DoC
2	MONITOR	DELL	E2210Hc	CN-OG337R-64180-97S-OQNS	FCC DoC
3	PRINTER	EPSON	LQ-300+II	G88Y074015	FCC DoC
4	MODEM	ACEEX	1414	0206026778	IFAXDM1414
5	KEYBOARD	DELL	SK-8115	MY-0DJ325-71619-99B-0475	FCC DoC
6	MOUSE	DELL	MOC5UO	I1401LVG	FCC DoC
Other test items					
No.	**Product**	**Brand**	**Model No.**	**Serial No.**	**FCC ID**
1	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
2	iPod shuffle	Apple	MC749TA/A	CC4DMFJUDFDM	NA

Conducted Emission test	
No.	**Signal cable description**
1	USB cable (Shielded, 1.3m with 1 core) / RS232 cable (Shielded, 1.3m with 1 core) / Wayne cable (Shielded, 0.8m with 1 core)
2	VGA cable (1.8m, with 2 cores)
3	USB cable (1.8m)
4	RS232 cable (1.2m)
5	USB cable (1.8m, with 1 core)
6	USB cable (1.8m)
Other test items	
No.	**Signal cable description**
1	USB cable (Shielded, 1.3m with 1 core) / RS232 cable (Shielded, 1.3m with 1 core)
2	USB cable (0.1m)

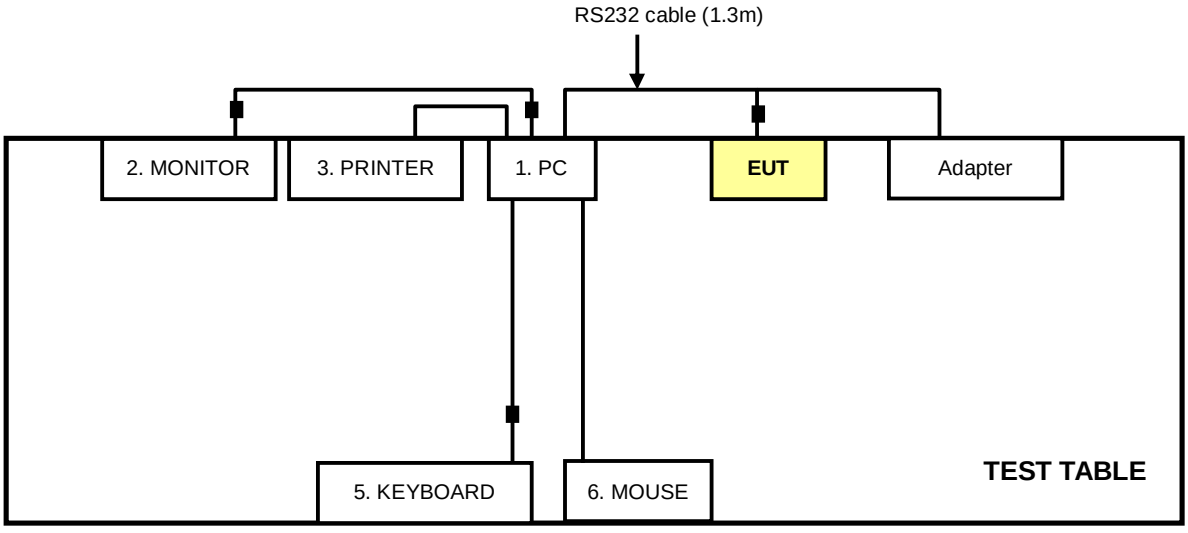
Note: 1. All power cords of the above support units are unshielded (1.8m).

3.5 CONFIGURATION OF SYSTEM UNDER TEST

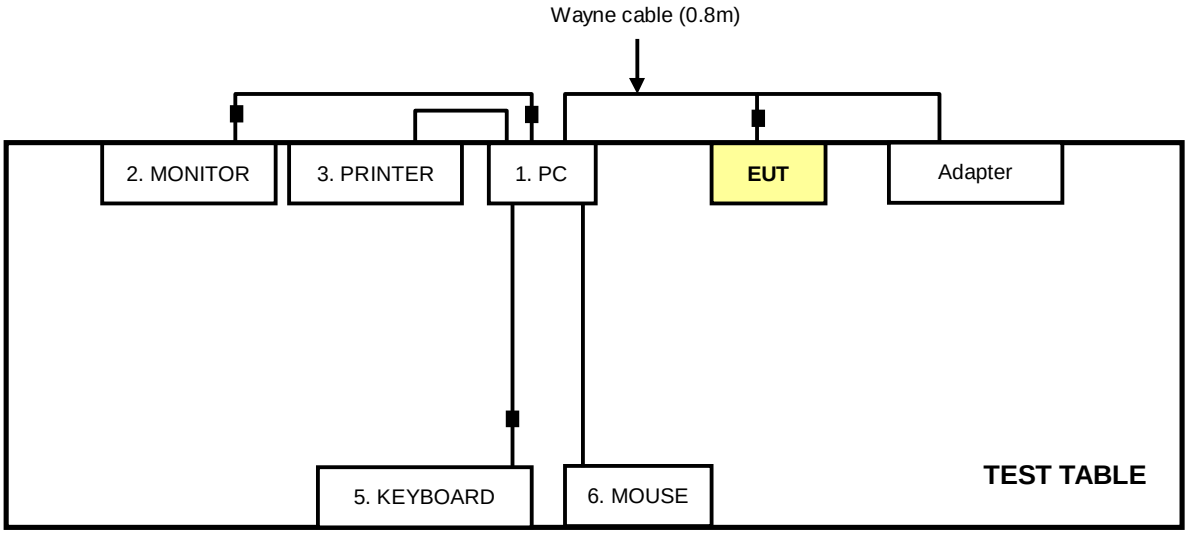
For conducted emission (Model: C150LU) test:



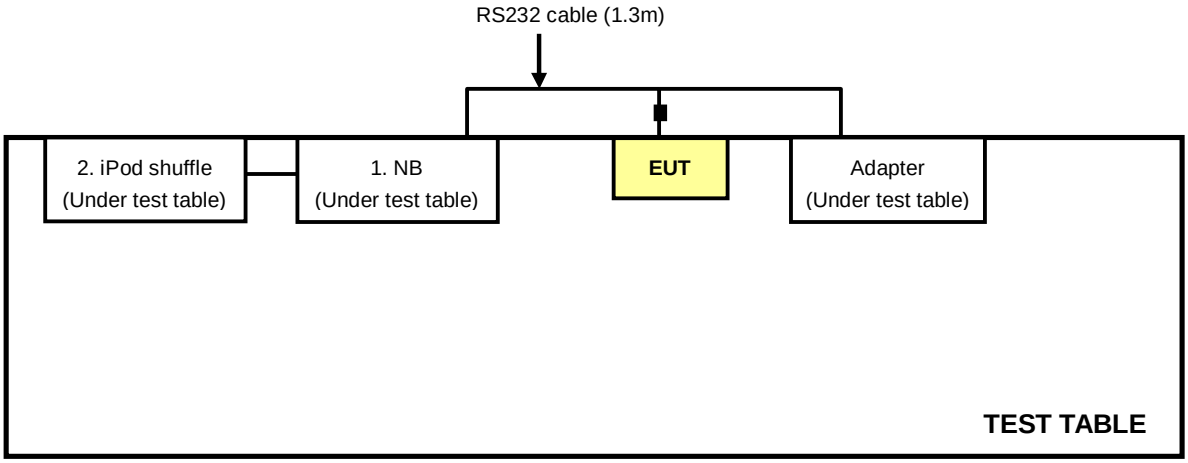
For conducted emission (Model: C150LR) test:



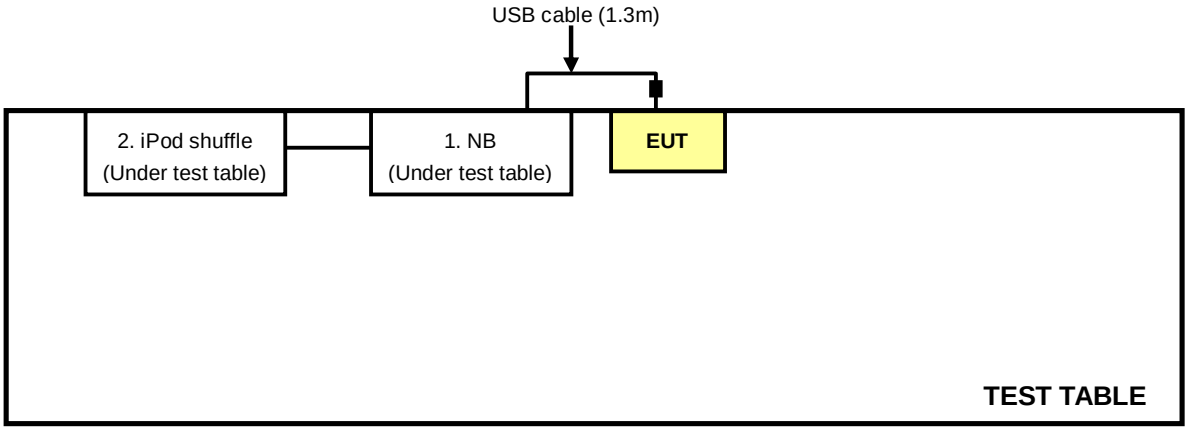
For conducted emission (Model: C150LW) test:



For radiated emission (Below 30MHz, Model: C150LR):



For Other test items (Model: C150LU):



4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class 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
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Feb. 29, 2012	Feb. 28, 2013
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK 8127	8127-523	Sep. 20, 2011	Sep. 19, 2012
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	848773/004	Nov. 01, 2011	Oct. 31, 2012
RF Cable (JYEBAO)	5DFB	COACAB-002	Aug. 06, 2011	Aug. 05, 2012
50 ohms Terminator	50	4	Nov. 12, 2011	Nov. 11, 2012
Software ADT	BV ADT_Cond_V7.3.7 .3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3 The VCCI Con A Registration No. is C-817.
4. Tested Date: July 25, 2012

4.1.3 TEST PROCEDURES

a. The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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.

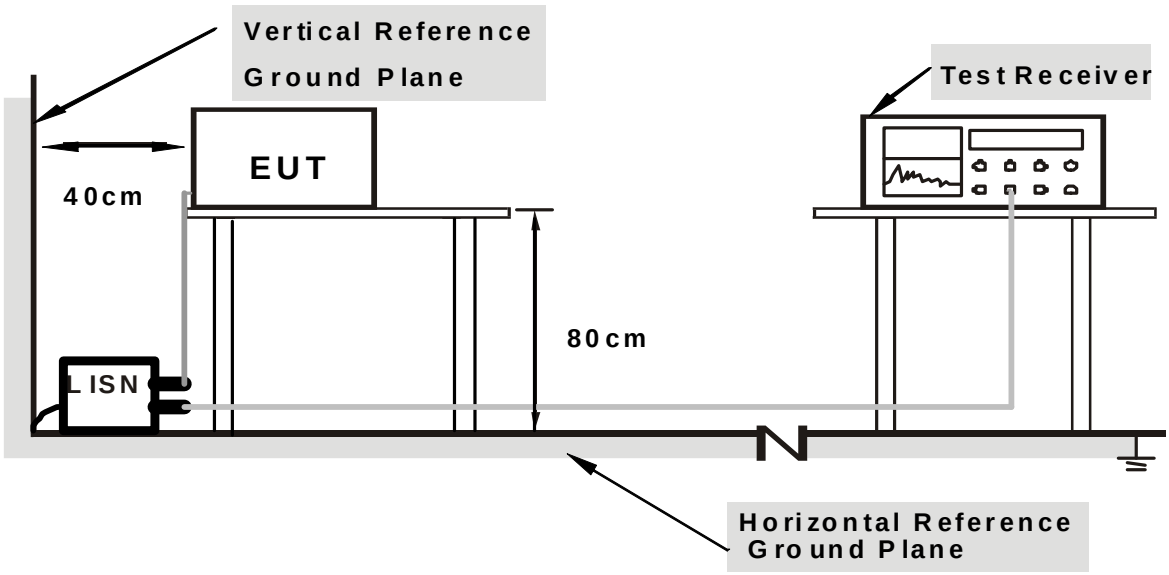
b. Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz 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 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 related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

For Mode 1

1. Turn on the power of all equipment.
2. The support unit 1 (PC) runs test program "C150TEST.exe" to enable EUT under transmission/receiving condition continuously via one USB cable.

For Mode 2

1. Turn on the power of all equipment.
2. The support unit 1 (PC) runs test program "C150TEST.exe" to enable EUT under transmission/receiving condition continuously via one RS232 cable.

For Mode 3

1. Turn on the power of all equipment.
2. The support unit 1 (PC) runs test program "C150TEST.exe" to enable EUT under transmission/receiving condition continuously via one Wayne cable.

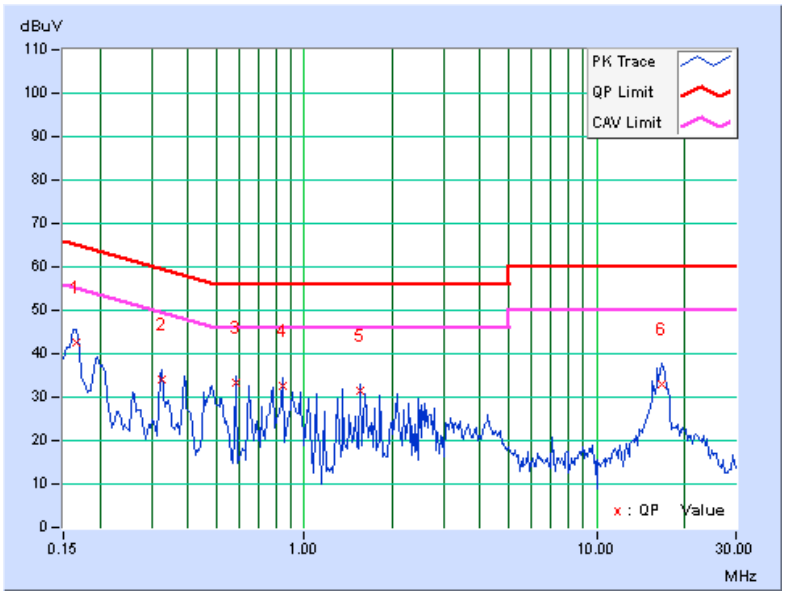
4.1.7 TEST RESULTS(MODE 1)

PHASE	Line (L)	6dB BANDWIDTH	9kHz

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	0.16562	0.06	42.71	40.93	42.77	40.99	65.18	55.18	-22.41	-14.19
2	0.32578	0.07	33.83	32.75	33.90	32.82	59.56	49.56	-25.66	-16.74
3	0.58359	0.09	33.06	33.04	33.15	33.13	56.00	46.00	-22.85	-12.87
4	0.84141	0.11	32.49	32.19	32.60	32.30	56.00	46.00	-23.40	-13.70
5	1.55469	0.16	31.48	29.97	31.64	30.13	56.00	46.00	-24.36	-15.87
6	16.69531	0.55	32.29	25.74	32.84	26.29	60.00	50.00	-27.16	-23.71

REMARKS:

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

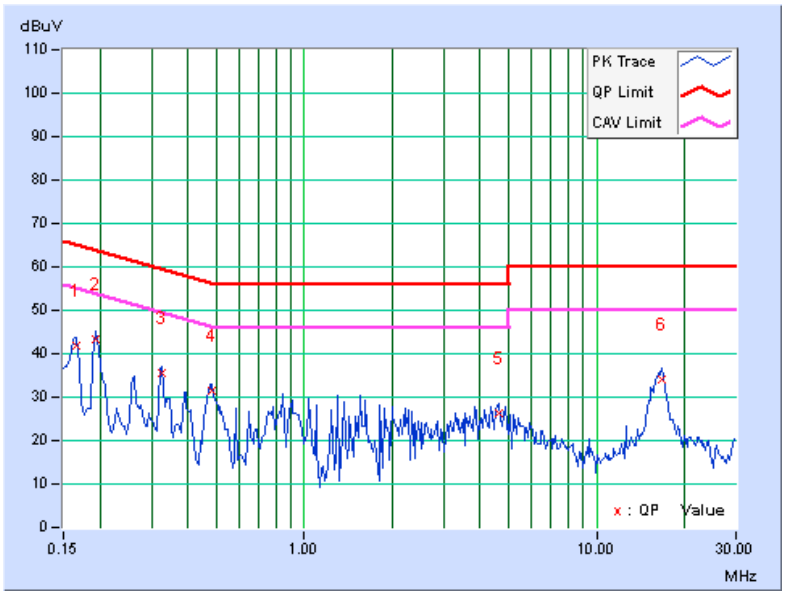


PHASE	Neutral (N)	6dB BANDWIDTH	9kHz

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	0.16562	0.07	41.62	41.15	41.69	41.22	65.18	55.18	-23.49	-13.96
2	**0.19297**	**0.07**	**43.12**	**42.87**	**43.19**	**42.94**	**63.91**	**53.91**	**-20.72**	**-10.97**
3	0.32578	0.08	35.31	35.07	35.39	35.15	59.56	49.56	-24.17	-14.41
4	0.48203	0.09	31.47	25.68	31.56	25.77	56.30	46.30	-24.75	-20.54
5	4.60547	0.26	25.95	22.32	26.21	22.58	56.00	46.00	-29.79	-23.42
6	16.68750	0.53	33.51	25.88	34.04	26.41	60.00	50.00	-25.96	-23.59

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.



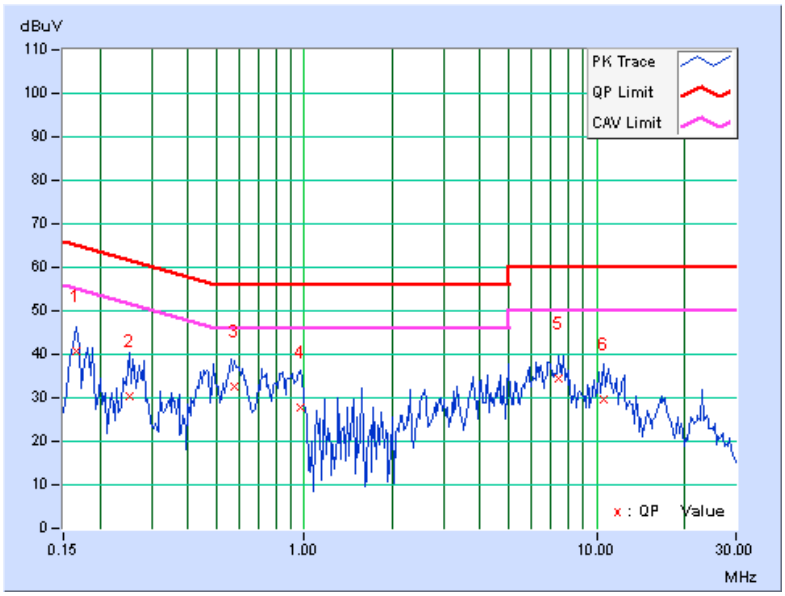
4.1.8 TEST RESULTS(MODE 2)

PHASE	Line (L)	6dB BANDWIDTH	9kHz

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	0.16562	0.06	40.79	40.37	40.85	40.43	65.18	55.18	-24.33	-14.75
2	0.25156	0.06	30.34	13.50	30.40	13.56	61.71	51.71	-31.30	-38.14
3	0.57578	0.08	32.49	19.39	32.57	19.47	56.00	46.00	-23.43	-26.53
4	0.97031	0.12	27.57	9.42	27.69	9.54	56.00	46.00	-28.31	-36.46
5	7.44922	0.34	34.19	19.17	34.53	19.51	60.00	50.00	-25.47	-30.49
6	10.55078	0.41	29.08	14.76	29.49	15.17	60.00	50.00	-30.51	-34.83

REMARKS:

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

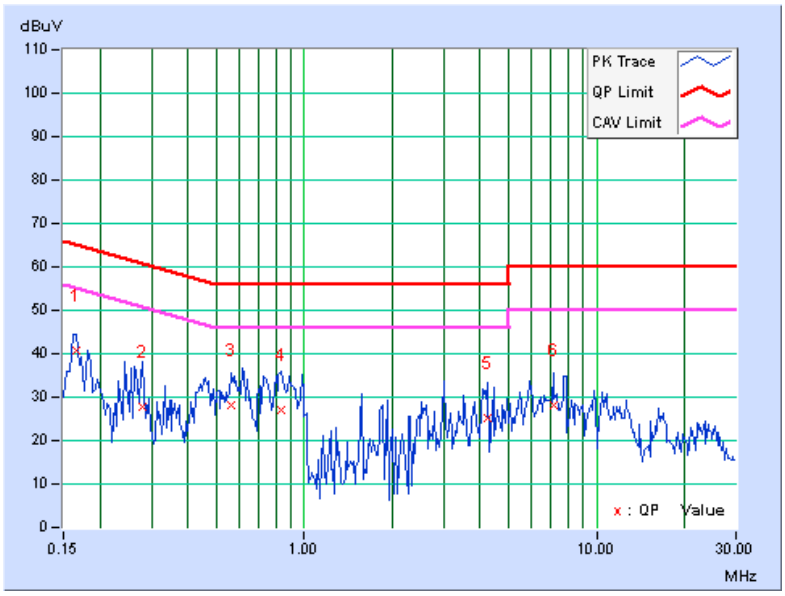


PHASE	Neutral (N)	6dB BANDWIDTH	9kHz

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	0.16562	0.07	40.73	40.51	40.80	40.58	65.18	55.18	-24.38	-14.60
2	0.27891	0.07	27.87	8.83	27.94	8.90	60.85	50.85	-32.90	-41.94
3	0.56016	0.09	28.24	12.78	28.33	12.87	56.00	46.00	-27.67	-33.13
4	0.82969	0.11	26.82	7.81	26.93	7.92	56.00	46.00	-29.07	-38.08
5	4.24609	0.26	25.10	7.66	25.36	7.92	56.00	46.00	-30.64	-38.08
6	7.13281	0.32	27.94	11.72	28.26	12.04	60.00	50.00	-31.74	-37.96

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.



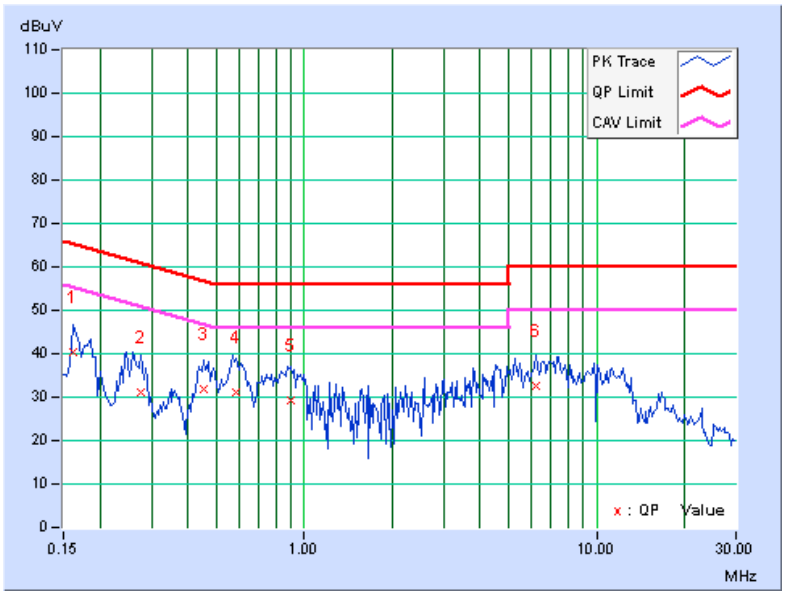
4.1.9 TEST RESULTS(MODE 3)

PHASE	Line (L)	6dB BANDWIDTH	9kHz

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	0.16172	0.06	40.27	39.74	40.33	39.80	65.38	55.38	-25.05	-15.58
2	0.27500	0.06	31.07	14.85	31.13	14.91	60.97	50.97	-29.83	-36.05
3	0.45469	0.07	31.76	16.34	31.83	16.41	56.79	46.79	-24.95	-30.37
4	0.58750	0.09	31.20	16.91	31.29	17.00	56.00	46.00	-24.71	-29.00
5	0.90000	0.11	29.03	12.43	29.14	12.54	56.00	46.00	-26.86	-33.46
6	6.24609	0.32	32.26	17.10	32.58	17.42	60.00	50.00	-27.42	-32.58

REMARKS:

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

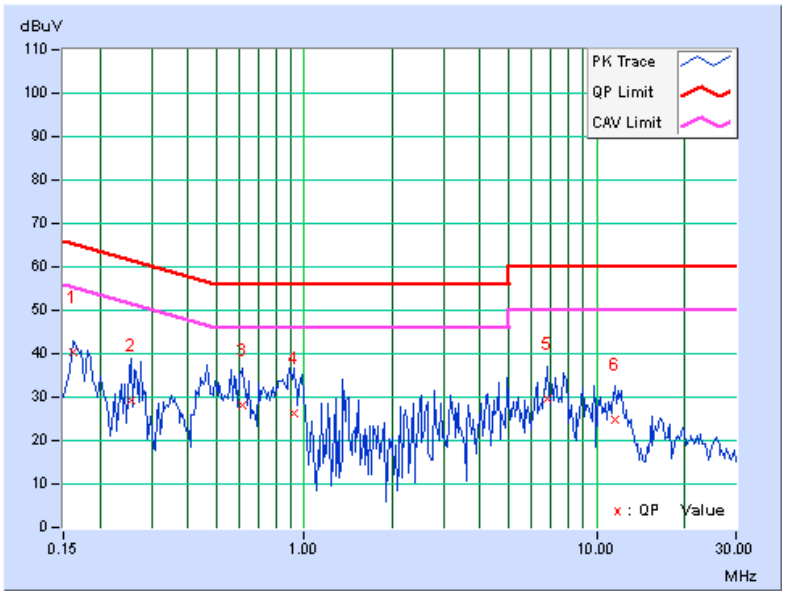


PHASE	Neutral (N)	6dB BANDWIDTH	9kHz

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	0.16172	0.07	40.29	39.94	40.36	40.01	65.38	55.38	-25.02	-15.37
2	0.25547	0.07	29.31	10.64	29.38	10.71	61.58	51.58	-32.19	-40.86
3	0.61094	0.09	28.03	9.93	28.12	10.02	56.00	46.00	-27.88	-35.98
4	0.91953	0.11	26.05	6.88	26.16	6.99	56.00	46.00	-29.84	-39.01
5	6.75781	0.31	29.32	12.18	29.63	12.49	60.00	50.00	-30.37	-37.51
6	11.53906	0.42	24.57	9.07	24.99	9.49	60.00	50.00	-35.01	-40.51

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 & OCCUPIED BANDWIDTH EASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

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.

4.2.2 TEST INSTRUMENTS

For below 30MHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4443A	MY48250349	July 26, 2012	July 25, 2013
	E4443A	MY49420002	Aug. 10, 2012	Aug. 09, 2013
Pre-Selector Agilent	N9039A	MY46520331	Aug. 10, 2012	Aug. 09, 2013
	N9039A	MY46520309	July 26, 2012	July 25, 2013
Signal Generator Agilent	N5181A	MY49060520	Aug. 10, 2012	Aug. 09, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 15, 2011	Nov. 14, 2012
	ZFL-1000VH2B	AMP-ZFL-02	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-01	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-359	Apr. 09, 2012	Apr. 08, 2013
	VULB 9168	9168-358	Apr. 06, 2012	Apr. 05, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Horn Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
Test Receiver LIG	ER-265	L09068005	Mar. 14, 2012	Mar. 13, 2013
Pre-Amplifier Agilent	8449B	3008A01975	Mar. 03, 2012	Mar. 02, 2013
Horn Antenna SCHWARZBECK	BBHA 9120	9120D-783	Sep. 21, 2011	Sep. 20, 2012
Loop Antenna(*) R&S	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2013
RF Cable	NA	RF104-110 RF104-206 RF104-209	Dec. 21, 2011	Dec.20, 2012
RF Cable	8DFB	CHFCAB-001 CHFCAB-002 CHFCAB-003	Nov. 15, 2011	Nov. 14, 2012
Software	ADT_Radiated_ V8.7.06	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 10m Chamber No. F.
4. The FCC Site Registration No. is 928149.
5 The VCCI Site Registration No. is R-3252 & G-136.
6 The CANADA Site Registration No. is IC 7450H-1.
7 Loop antenna was used for all emissions below 30MHz.
8 Tested Date: Aug. 13, 2012

For above 30MHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 29, 2011	Aug. 28, 2012
Pre-Selector Agilent	N9039A	MY46520310	Aug. 29, 2011	Aug. 28, 2012
Signal Generator Agilent	N5181A	MY49060347	July 25, 2012	July 24, 2013
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-04	Nov. 15, 2011	Nov. 14, 2012
Pre-Amplifier Agilent	8449B	3008A02465	Feb. 27, 2012	Feb. 26, 2013
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Apr. 06, 2012	Apr. 05, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 23, 2011	Nov. 22, 2012
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 27, 2011	Dec. 26, 2012
RF Cable	NA	CHHCAB_001	Oct. 08, 2011	Oct. 07, 2012
Software	ADT_Radiated_V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Aug. 13, 2012

4.2.3 TEST PROCEDURES

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission 30~1000MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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 is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

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

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

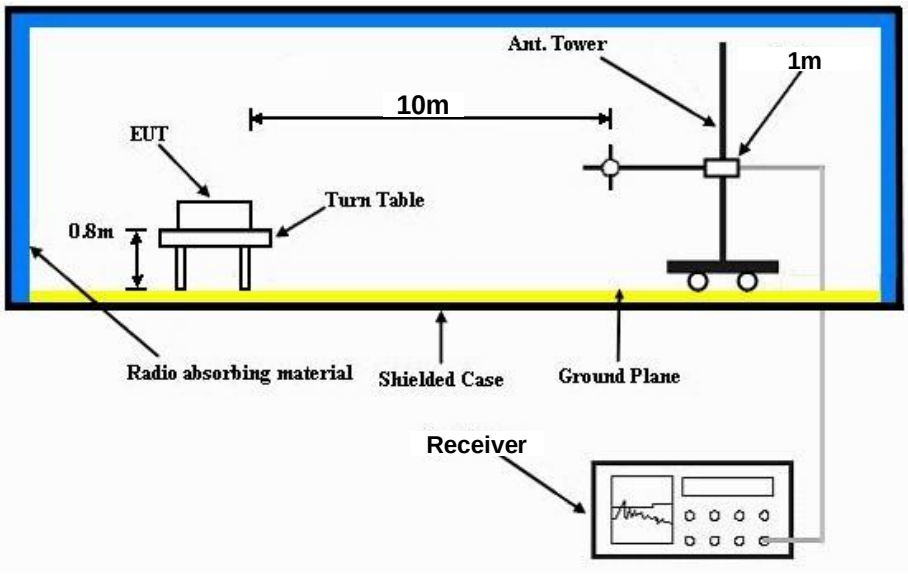
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency 30MHz ~ 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

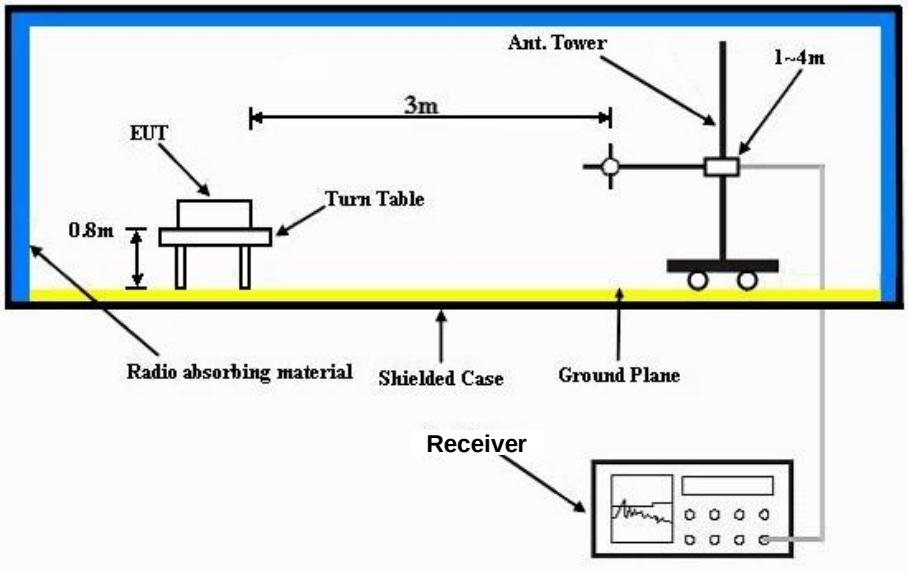
No deviation

4.2.5 TEST SETUP

For Radiated emission below 30MHz



For Radiated emission 30~1000MHz



For the actual test configuration, please refer to the related item in this test report - Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

4.2.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	13.553 ~ 13.567MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 73%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Frank Liu		

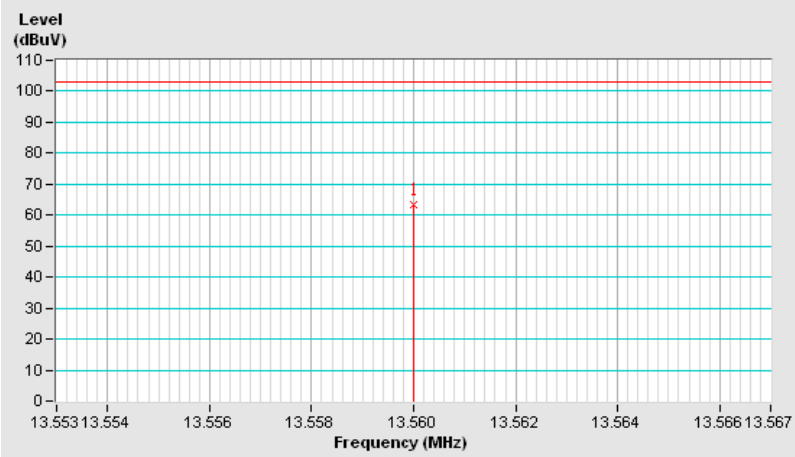
LOOP ANTENNA TEST DISTANCE: AT 10 M (X AXIS)								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*13.56	63.6 QP	103.1	-39.5	1.00	0	63.60	0.00

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.
5. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/10)^2$ 10m
= 103.1dBuV/m



EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	13.553 ~ 13.567MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 73%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Frank Liu		

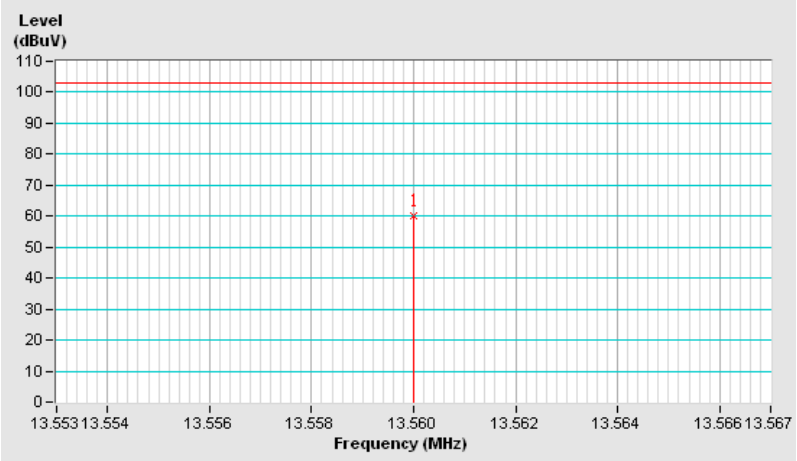
LOOP ANTENNA TEST DISTANCE: AT 10 M (Y AXIS)								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*13.56	60.1 QP	103.1	-43.0	1.00	0	60.10	0.00

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.
5. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/10)^2$ 10m
= 103.1dBuV/m



EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	Below 30MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 73%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Frank Liu		

LOOP ANTENNA TEST DISTANCE: AT 10 M (X AXIS)								
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	0.06	52.2 QP	91.1	-38.9	1.00	0	52.20	0.00
2	27.12	11.6 QP	48.6	-37.0	1.00	0	10.96	0.64
LOOP ANTENNA TEST DISTANCE: AT 10 M (Y AXIS)								
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	0.06	51.2 QP	91.1	-39.9	1.00	0	51.20	0.00
2	27.12	12.7 QP	48.6	-35.9	1.00	0	12.06	0.64

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	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 73%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Frank Liu		

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	156.12	26.9 QP	43.5	-16.6	1.50 H	360	12.49	14.43
2	189.87	27.7 QP	43.5	-15.8	1.50 H	222	15.75	11.99
3	217.58	31.3 QP	46.0	-14.7	1.50 H	266	19.45	11.82
4	**302.49**	**42.3 QP**	**46.0**	**-3.7**	**1.00 H**	**264**	**26.94**	**15.36**
5	604.82	34.3 QP	46.0	-11.7	1.50 H	85	12.01	22.28
6	799.51	31.2 QP	46.0	-14.8	1.00 H	360	5.61	25.61
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	40.66	24.3 QP	40.0	-15.7	1.00 V	84	10.43	13.85
2	158.61	25.5 QP	43.5	-18.0	1.00 V	96	11.16	14.36
3	217.34	24.6 QP	46.0	-21.4	1.50 V	19	12.80	11.81
4	302.49	32.5 QP	46.0	-13.5	1.00 V	6	17.17	15.36
5	604.82	27.0 QP	46.0	-19.0	1.50 V	72	4.74	22.28
6	804.48	25.5 QP	46.0	-20.5	1.50 V	306	-0.19	25.68

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.

4.3 20dB BANDWIDTH

4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

The 20dB bandwidth shall be specified in operating frequency band.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 14, 2011	Dec. 13, 2012

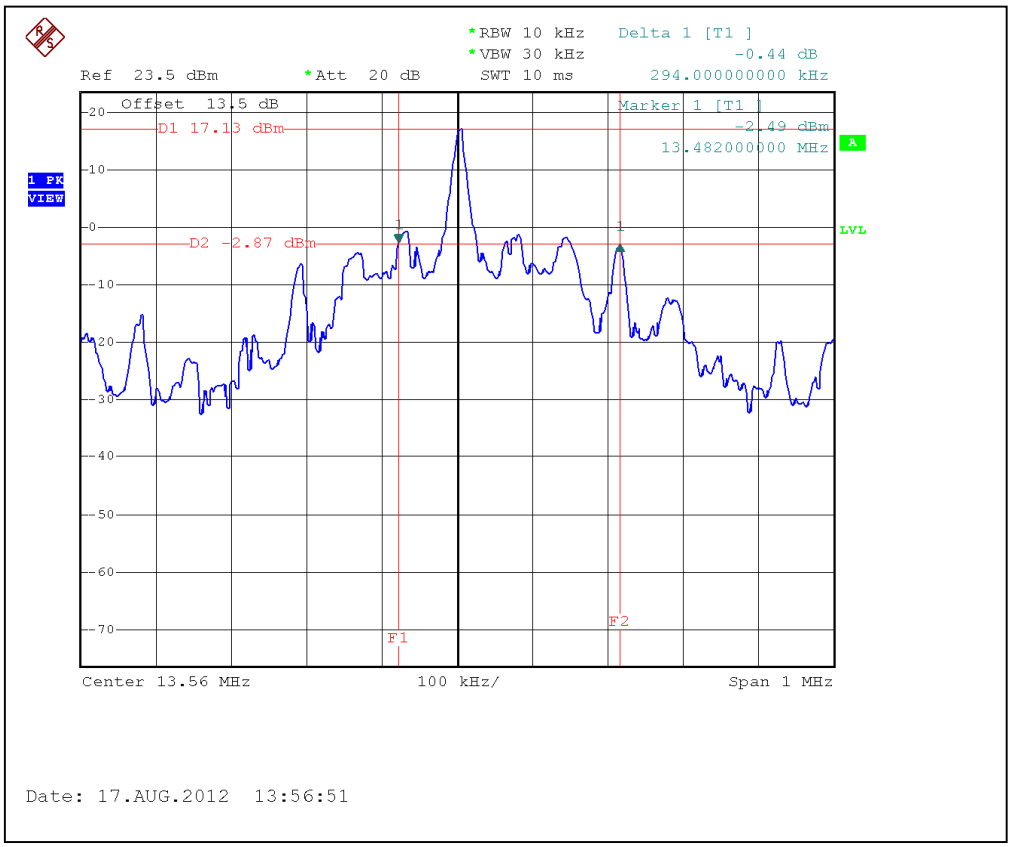
Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Aug. 17, 2012

4.3.3 EUT OPERATING CONDITION

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 10kHz RBW and 30kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3.4 TEST RESULTS

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	PASS/FAIL
13.482 MHz	13.776 MHz	13.11 – 14.01	PASS



4.4 FREQUENCY STABILITY

4.4.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within ±0.01%(± 100ppm) of the operating frequency over a temperature variation of –20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100036	Dec. 14, 2011	Dec. 13, 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. Tested date : Aug. 17, 2012

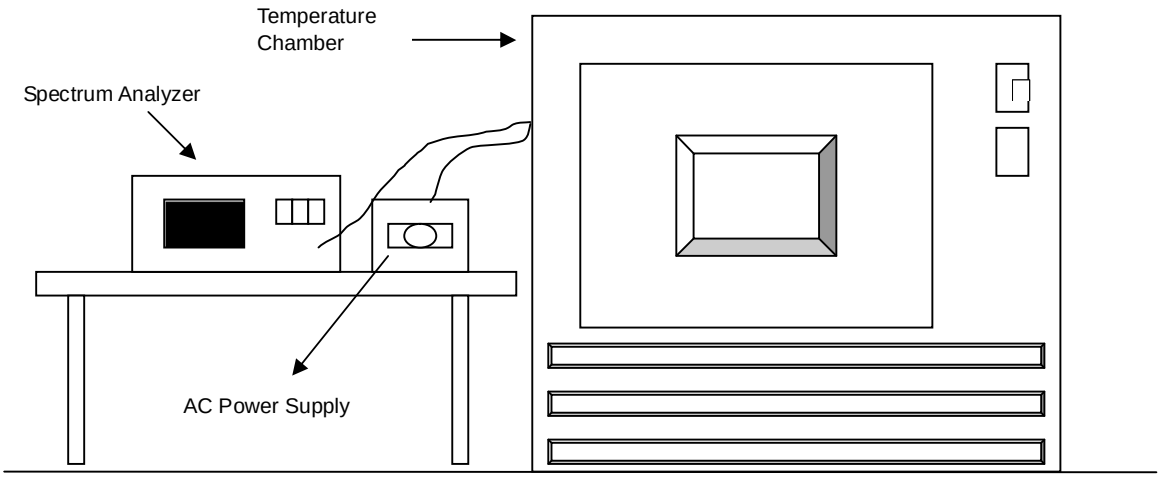
4.4.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.4.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	120	13.560066	4.867	13.560062	4.572	13.560039	2.876	13.560077	5.678
40	120	13.560028	2.065	13.560023	1.696	13.560076	5.605	13.560023	1.696
30	120	13.560047	3.466	13.560028	2.065	13.560076	5.605	13.560089	6.563
20	120	13.560199	14.676	13.560229	16.888	13.56023	16.962	13.560256	18.879
10	120	13.559811	-13.938	13.559805	-14.381	13.559799	-14.823	13.55976	-17.699
0	120	13.560058	4.277	13.560091	6.711	13.560093	6.858	13.560091	6.711
-10	120	13.559948	-3.835	13.559975	-1.844	13.559934	-4.867	13.559962	-2.802
-20	120	13.560104	7.670	13.560075	5.531	13.560107	7.891	13.560087	6.416
-30	120	13.560109	8.038	13.560112	8.260	13.560075	5.531	13.560098	7.227

FREQUEMCY STABILITY VERSUS VOLTAGE									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
20	138	13.560197	14.528	13.560237	17.478	13.560234	17.257	13.560247	18.215
	120	13.560199	14.676	13.560229	16.888	13.56023	16.962	13.560256	18.879
	102	13.560193	14.233	13.560237	17.478	13.560225	16.593	13.560255	18.805

5 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.adt.com.tw

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

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

No any modifications are made to the EUT by the lab during the test.

--- END ---