FCC TEST REPORT
(RFID)

REPORT NO.:	RF130902E05F
MODEL NO.:	xAPT-103PUW, FD410, xCE_T103PUW
FCC ID:	MQT-XAPT103PUWT
RECEIVED:	Sep. 02, 2013
TESTED:	Sep. 09 to 18, 2013 ; Aug. 03 to 25, 2016
ISSUED:	Sep. 09, 2016

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 :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
TEST LOCATION (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, 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.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130902E05F	Original release	Sep. 09, 2016

1 CERTIFICATION

PRODUCT :	Terminal
BRAND NAME :	XAC, First Data
MODEL NO. :	xAPT-103PUW, FD410, xCE_T103PUW
TEST SAMPLE :	ENGINEERING SAMPLE
APPLICANT :	XAC AUTOMATION CORP.
TESTED :	Sep. 09 to 18, 2013 ; Aug. 03, 2016
STANDARDS:	FCC Part 15, Subpart C (Section 15.225) FCC Part 15, Subpart C (Section 15.215) ANSI C63.10: 2013

The above equipment (Model: xAPT-103PUW) 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:** Sep. 09, 2016
Midoli Peng / Specialist

Approved by : _____ , **Date:** Sep. 09, 2016
May Chen / Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C (SECTION 15.225, 15.215)			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	PASS	Meet the requirement of limit. Minimum passing margin is -14.89dB at 0.17390MHz.
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 -54.1dB at 13.56MHz
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	PASS	Meet the requirement of limit.
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	PASS	Meet the requirement of limit.
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 -1.7dB at 40.67MHz
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 Emission (966 Chamber No. H)	5.46 dB
Radiated Emission (966 Chamber No. G)	5.37 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Terminal
MODEL NO.	xAPT-103PUW, FD410, xCE_T103PUW
POWER SUPPLY	DC 7.4V from Battery DC 12V from power adapter
MODULATION TYPE	ASK
OPERATING FREQUENCY	13.56MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter (Optional) x 1

NOTE:

1. The EUT could be supplied with DC 7.4V battery or power adapter as the following table:

Battery		
Brand	Model No.	Spec.
Foxlink	FD400	DC 7.4V, 2300mAh (17.02Wh)
Adapter (only for test, not for sale)		
Brand	Model No.	Spec.
DELTA	ADP-36JH B	AC I/P: 100-240V, 50-60Hz, 1.0A AC input cable: Unshielded, 1.85m DC O/P: 12V, 3A DC output cable: Unshielded, 1.8m with one core

2. All models are listed as below table:

Brand	Model	Difference
XAC	xAPT-103PUW	For marketing requirement
XAC	xCE_T103PUW	
First Data	FD410	

From the above models, model: xAPT-103PUW was selected as representative model for the test and its data was recorded in this report.

3. The EUT is a WLAN, RFID, GSM and WCDMA device.

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

GPRS, EDGE, WCDMA, HSDPA and HSUPA Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
Ethertronics Inc.	T-000084-01	FPCB	IPEX	0.14	850
				2.57	1900
WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
ACX	AT3216-T2R4PAA	Chip	NA	1.5	2400-2500
RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency range (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop	NA	13	13.56

5. WLAN, RFID, GSM and WCDMA technology cannot transmit at same time.
6. The EUT is pre-tested under following test modes :

Pre-test Mode	Description
Mode A	Battery mode
Mode B	**Adapter mode**

For the above modes, the worse radiated emissions test was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

7. 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)	BW	FS	
-	√	√	√	√	√	-

Where **PLC:** Power Line Conducted Emission **RE:** Radiated Emission
BW: 20dB Bandwidth **FS:** Frequency Stability

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	ASK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 66%RH	120Vac, 60Hz	Jyunchun Lin
RE	25deg. C, 14%RH	120Vac, 60Hz	Nelson Teng
	35deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
BW	25deg. C, 60%RH	120Vac, 60Hz	James Chan
FS	25deg. C, 60%RH	7.4Vdc	James Chan

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.225)

FCC Part 15, Subpart C (15.215)

ANSI C63.10: 2013

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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Adapter	DELTA	ADP-36JH B	NA	NA	Supplied by Client
B.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab

Note:

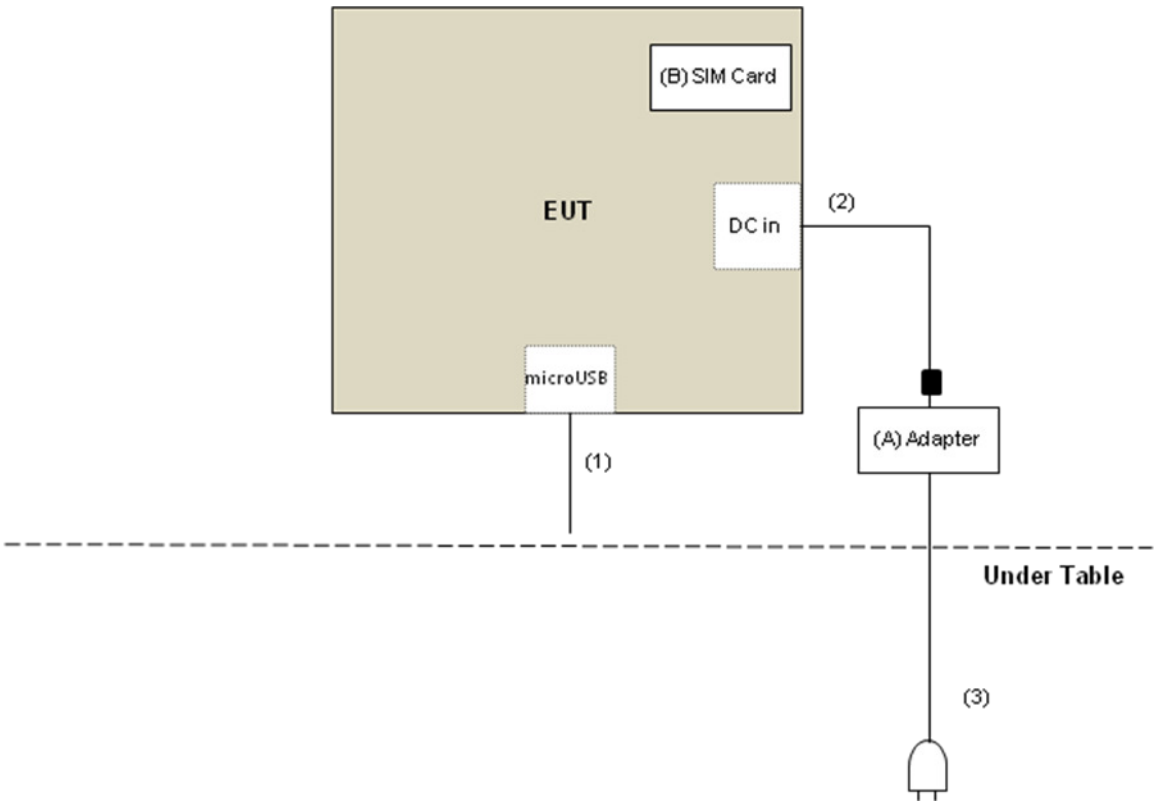
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	microUSB Cable	1	1	No	0	Provided by Lab
2.	DC Cable	1	1.8	No	1	Supplied by client
3.	AC Cable	1	1.85	No	0	Supplied by client

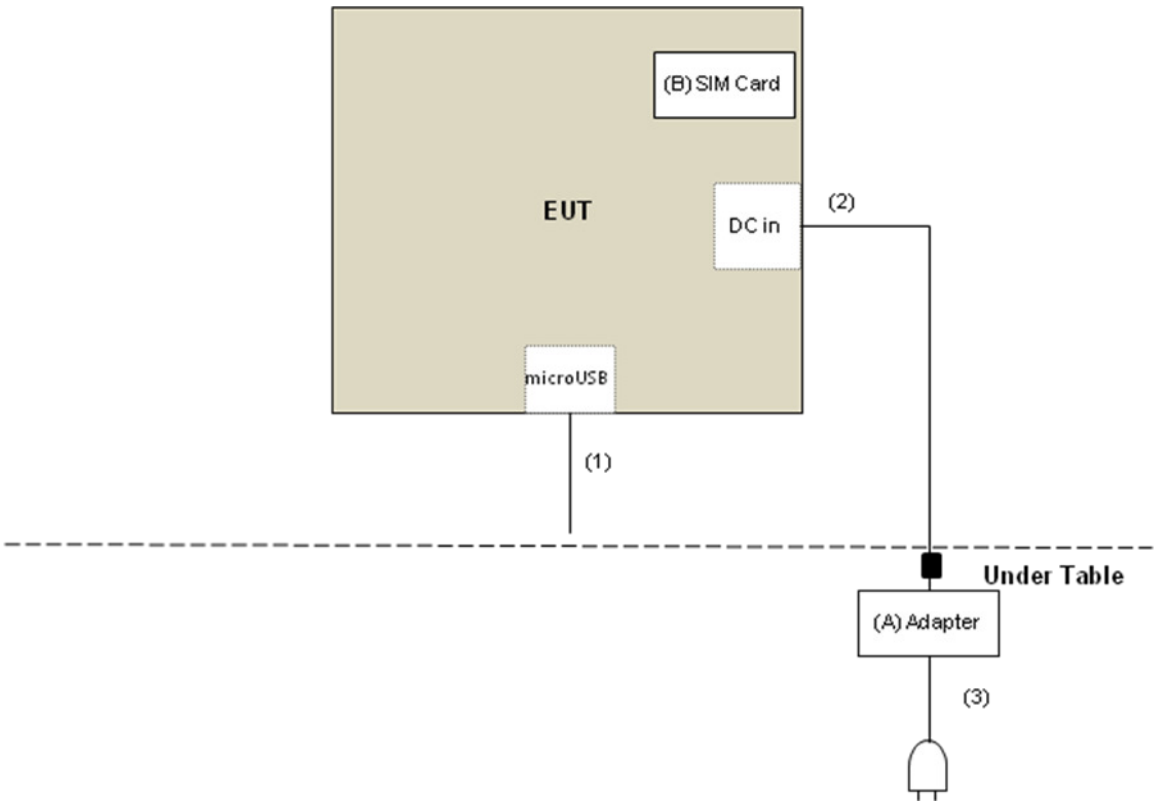
Note: The core(s) is(are) originally attached to the cable(s)

3.5 CONFIGURATION OF SYSTEM UNDER TEST

For conducted emission :



For radiated emission :



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. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May 09, 2016	May 08, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ENV216	100072	June 13, 2016	June 12, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	848773/004	Oct. 28, 2015	Oct. 27, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 08, 2016	Mar. 07, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-003	Sep. 14, 2015	Sep. 13, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 23, 2015	Sep. 22, 2016
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2015	Sep. 30, 2016
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Aug. 25, 2016

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.
b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
c. Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

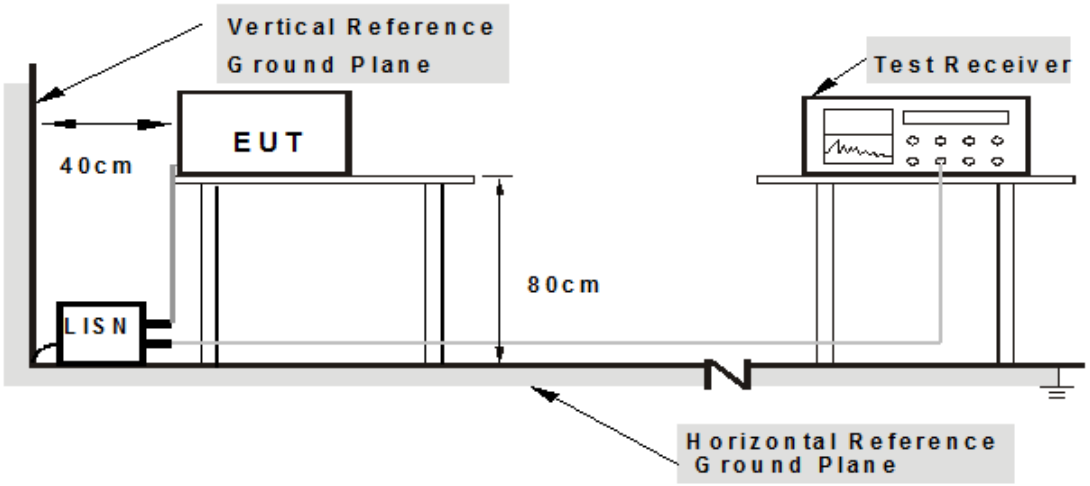
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

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

4.1.6 EUT OPERATING CONDITIONS

1. Turn on the power of all equipment.
2. The EUT runs a test program “PTest.exe” to under transmission condition (RFID) continuously.

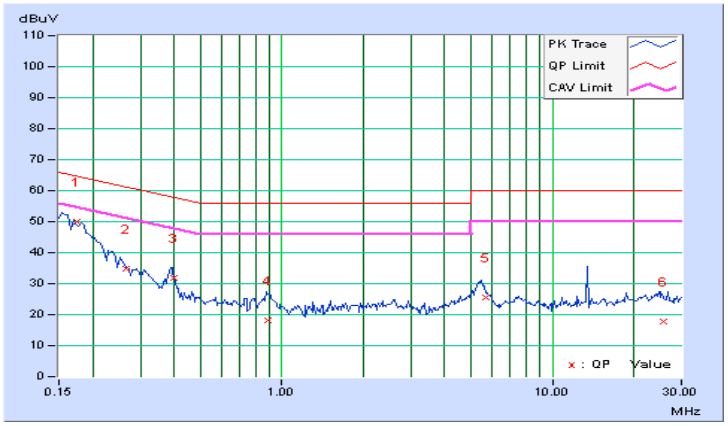
4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17390	10.30	39.58	23.30	49.88	33.60	64.77	54.77	-14.89	-21.17
2	0.26638	10.29	24.55	8.84	34.84	19.13	61.23	51.23	-26.39	-32.10
3	0.39827	10.30	21.72	11.34	32.02	21.64	57.89	47.89	-25.87	-26.25
4	0.88650	10.24	7.77	2.73	18.01	12.97	56.00	46.00	-37.99	-33.03
5	5.66355	10.46	15.10	8.41	25.56	18.87	60.00	50.00	-34.44	-31.13
6	25.69842	11.12	6.67	1.41	17.79	12.53	60.00	50.00	-42.21	-37.47

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

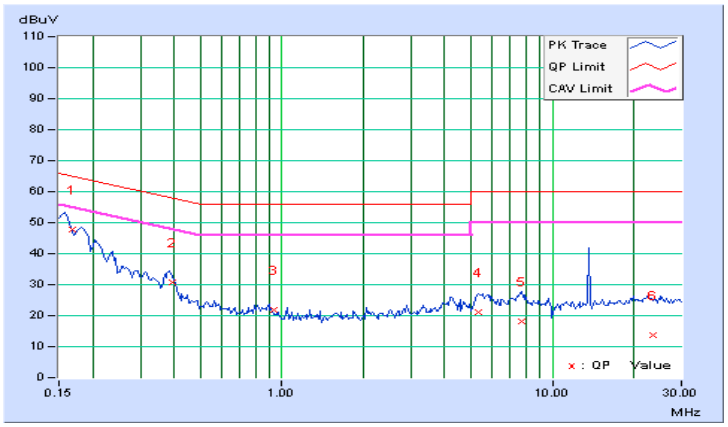


PHASE	Neutral (N)	6dB BANDWIDTH	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16780	10.29	37.55	20.71	47.84	31.00	65.07	55.07	-17.23	-24.07
2	0.39410	10.28	20.42	12.63	30.70	22.91	57.98	47.98	-27.28	-25.07
3	0.93508	10.23	11.59	10.20	21.82	20.43	56.00	46.00	-34.18	-25.57
4	5.31252	10.46	10.62	2.87	21.08	13.33	60.00	50.00	-38.92	-36.67
5	7.71185	10.51	7.64	1.60	18.15	12.11	60.00	50.00	-41.85	-37.89
6	23.48762	11.07	2.65	-2.70	13.72	8.37	60.00	50.00	-46.28	-41.63

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 emission shall not exceed the following limits:
(a) 15.848 millivolts/m (84 dBμ V/m) at 30 m, within the band 13.553-13.567 MHz.
(b) 334 microvolts/m (50.5 dBμ V/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.
(c) 106 microvolts/m (40.5 dBμ V/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz.

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.

4.2.2 TEST INSTRUMENTS

For below 30MHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier EMCI	EMC001340	980142	Jan. 09, 2013	Jan. 08, 2014
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 10, 2012	Dec. 09, 2014
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 21, 2013	Jan. 20, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
Software	ADT_Radiated _V8.7.07	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.
   * The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: Sep. 09 to 10, 2013

For above 30MHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 06, 2016	July 05, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D-FB	CHGCAB-001 -1 CHGCAB-001 -2	Oct. 03, 2015	Oct. 02, 2016
	RF-141	CHGCAB-004	Oct. 03, 2015	Oct. 02, 2016
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	CM100	NA	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-WD01	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 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The CANADA Site Registration No. is IC 7450H-2.
5. Tested Date: Aug. 03, 2016

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 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. 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:

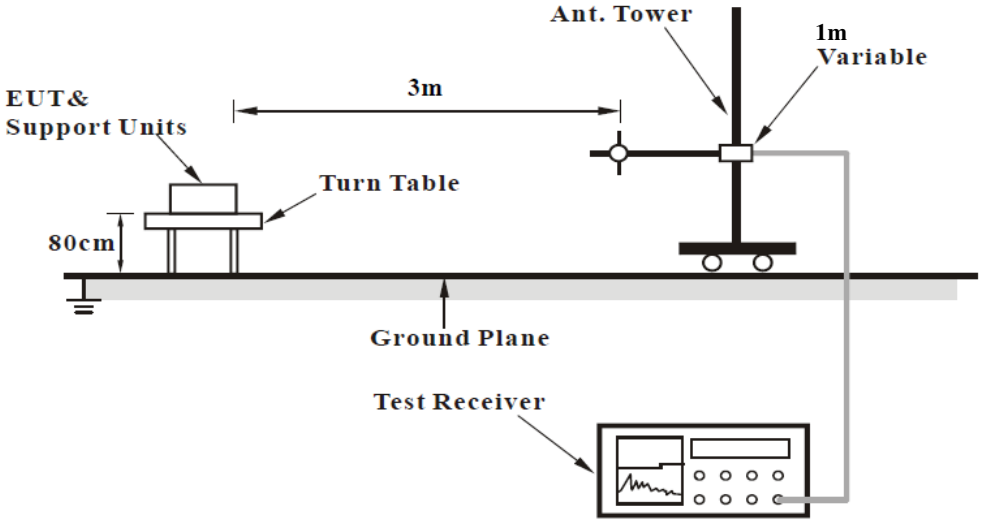
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency 30MHz ~ 1GHz.

4.2.4 DEVIATION FROM TEST STANDARD

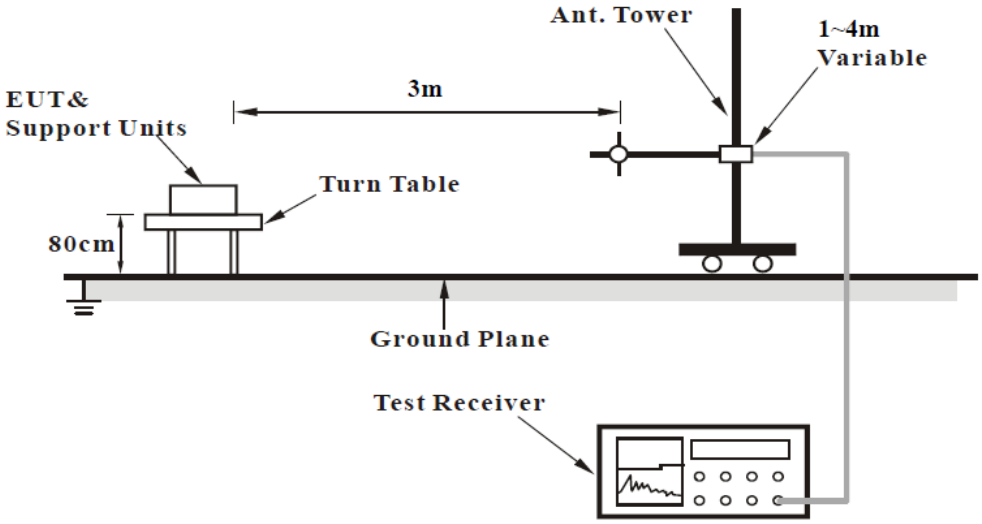
No deviation

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	25deg. C, 64%RH	**DETECTOR FUNCTION**	Quasi-Peak (QP)
TESTED BY	Nelson Teng		

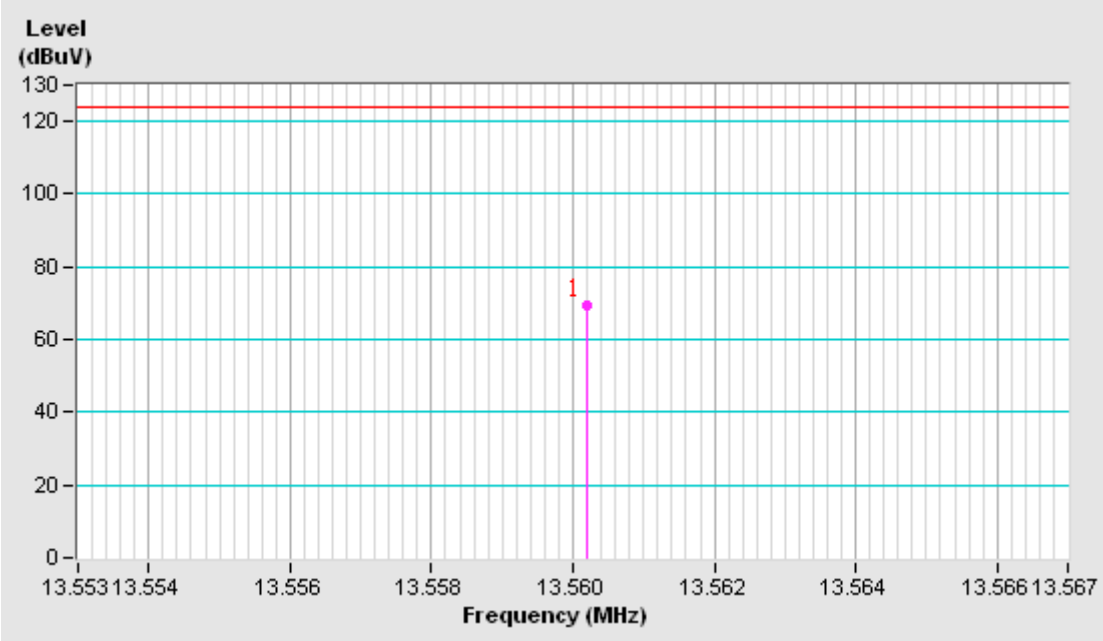
LOOP ANTENNA TEST DISTANCE: AT 3 M (X AXIS)								
No.	**Freq. (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*13.56	69.6 QP	124.0	-54.4	1.00	77	73.30	-3.70

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) – Pre-Amplifier 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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	13.553 ~ 13.567MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 64%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Nelson Teng		

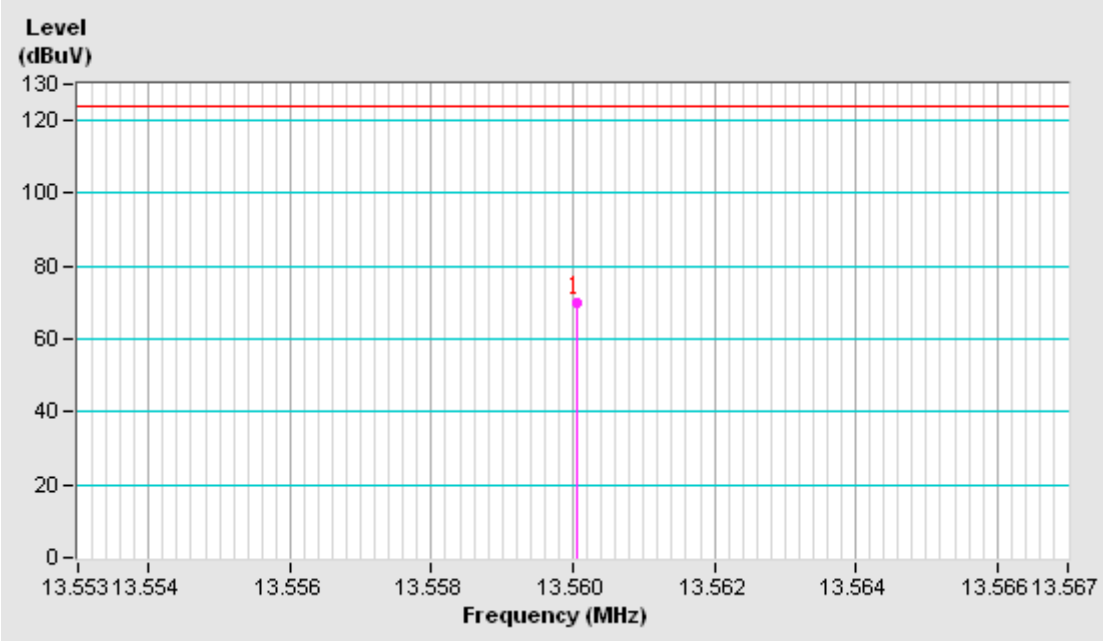
LOOP ANTENNA TEST DISTANCE: AT 3 M (Y AXIS)								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*13.56	69.9 QP	124.0	-54.1	1.00	358	73.60	-3.70

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) – Pre-Amplifier 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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60Hz	FREQUENCY RANGE	Below 30MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 64%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Nelson Teng		

LOOP ANTENNA TEST DISTANCE: AT 3 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	0.03	68.70 QP	118.30	-49.60	1.00	0	40.00	28.70
2	0.10	54.10 QP	108.00	-53.90	1.00	150	-4.60	58.70
3	1.23	41.00 QP	65.80	-24.80	1.00	39	41.00	0.00
4	4.19	47.10 QP	69.50	-22.40	1.00	31	50.10	-3.00
5	17.08	37.50 QP	69.50	-32.00	1.00	151	41.80	-4.30
6	28.63	26.80 QP	69.50	-42.70	1.00	142	30.70	-3.90
LOOP ANTENNA TEST DISTANCE: AT 3 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	0.03	67.30 QP	117.00	-49.70	1.00	121	-1.30	68.60
2	0.12	50.80 QP	106.00	-55.20	1.00	155	-6.10	56.90
3	4.16	43.20 QP	69.50	-26.30	1.00	293	46.20	-3.00
4	5.98	37.90 QP	69.50	-31.60	1.00	44	41.10	-3.20
5	17.15	35.30 QP	69.50	-34.20	1.00	16	39.60	-4.30
6	27.12	28.30 QP	69.50	-41.20	1.00	53	33.80	-5.50

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) – Pre-Amplifier 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	30~1000MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 67%RH	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Weiwei Lo		

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	94.92	34.0 QP	43.5	-9.5	2.00 H	258	47.3	-13.3
2	122.05	39.5 QP	43.5	-4.0	1.50 H	281	49.2	-9.7
3	149.16	41.1 QP	43.5	-2.4	2.00 H	291	48.8	-7.7
4	501.71	37.4 QP	46.0	-8.6	2.00 H	93	38.9	-1.5
5	610.21	35.4 QP	46.0	-10.6	1.50 H	360	34.0	1.4
6	813.59	37.2 QP	46.0	-8.8	1.00 H	130	32.5	4.7
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	**40.67**	**38.3 QP**	**40.0**	**-1.7**	**1.00 V**	**323**	**46.8**	**-8.5**
2	122.03	32.6 QP	43.5	-10.9	1.00 V	14	42.3	-9.7
3	149.16	38.3 QP	43.5	-5.2	1.00 V	154	46.0	-7.7
4	358.22	31.1 QP	46.0	-14.9	1.50 V	213	36.3	-5.2
5	515.29	33.9 QP	46.0	-12.1	1.00 V	2	35.0	-1.1
6	610.23	34.0 QP	46.0	-12.0	1.00 V	358	32.6	1.4

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) – Pre-Amplifier 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
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

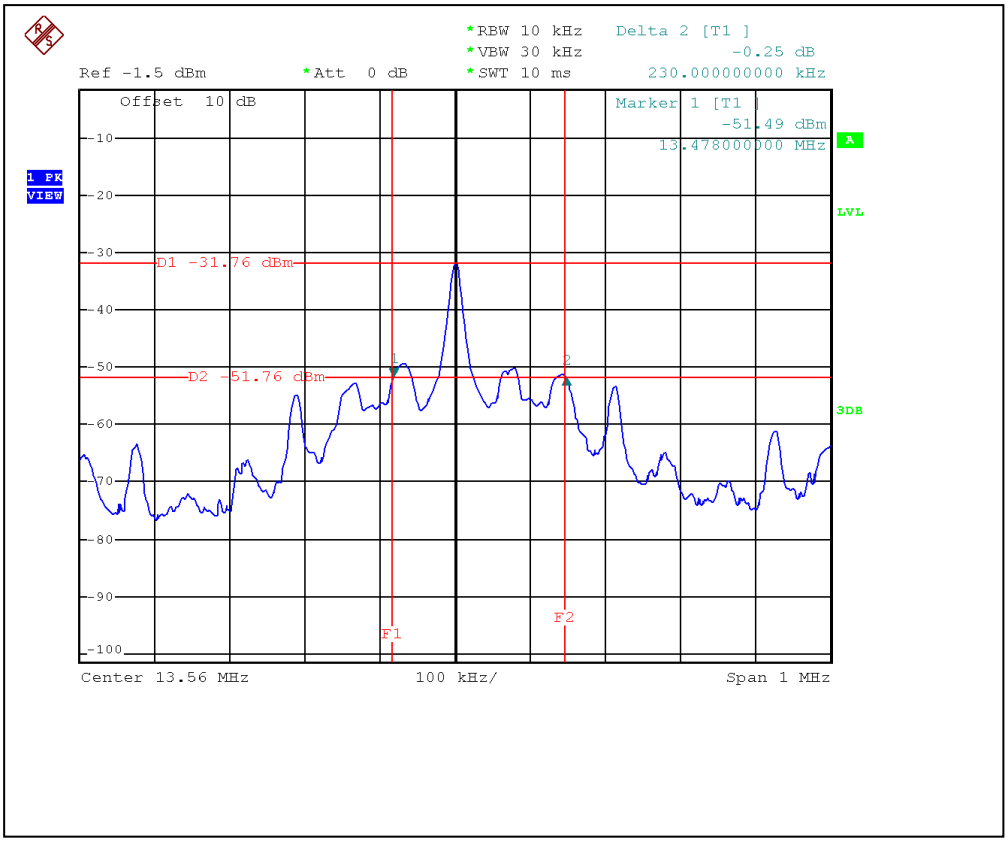
Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 18, 2013

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
13.478 MHz	13.708 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 –30 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
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 17, 2013	Jan. 16, 2014
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
Digital Multimeter FLUKE	87III	73680266	Nov. 27, 2012	Nov. 06, 2013

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Sep. 18, 2013

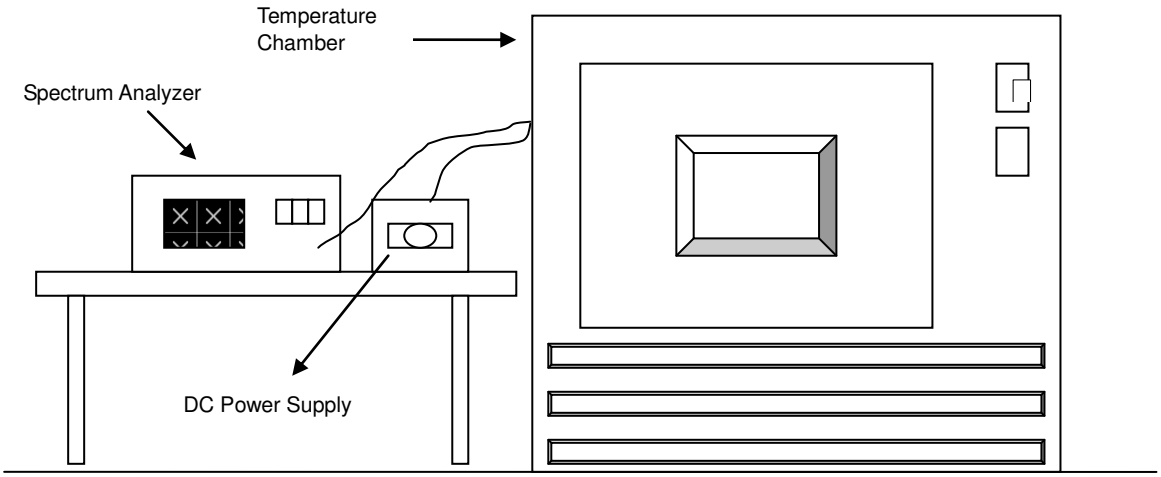
4.4.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC 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 (Vdc)	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)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	7.4	13.56003	0.00022	13.56003	0.00022	13.56002	0.00015	13.56003	0.00022
40	7.4	13.56005	0.00037	13.56006	0.00044	13.56005	0.00037	13.56006	0.00044
30	7.4	13.55995	-0.00037	13.55994	-0.00044	13.55995	-0.00037	13.55995	-0.00037
20	7.4	13.55996	-0.00029	13.55996	-0.00029	13.55994	-0.00044	13.55994	-0.00044
10	7.4	13.56004	0.00029	13.56004	0.00029	13.56005	0.00037	13.56005	0.00037
0	7.4	13.56004	0.00029	13.56005	0.00037	13.56004	0.00029	13.56004	0.00029
-10	7.4	13.56001	0.00007	13.56	0.00000	13.56001	0.00007	13.56002	0.00015
-20	7.4	13.55999	-0.00007	13.55998	-0.00015	13.55998	-0.00015	13.55999	-0.00007
-30	7.4	13.56003	0.00022	13.56004	0.00029	13.56004	0.00029	13.56005	0.00037

FREQUEMCY STABILITY VERSUS VOLTAGE									
TEMP. (℃)	POWER SUPPLY (Vdc)	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)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	6.29	13.55996	-0.00029	13.55996	-0.00029	13.55994	-0.00044	13.55994	-0.00044
	7.4	13.55996	-0.00029	13.55996	-0.00029	13.55994	-0.00044	13.55994	-0.00044
	8.51	13.55996	-0.00029	13.55996	-0.00029	13.55994	-0.00044	13.55994	-0.00044

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/Telecom Lab:
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety 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.

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

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

--- END ---