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# FCC TEST REPORT

**REPORT NO.:** RF110613E06

**MODEL NO.:** FD35, FD-35-ZKA

**FCC ID:** MQT-FD35

**RECEIVED:** June 13, 2011

**TESTED:** June 16 to 24, 2011

**ISSUED:** July 12, 2011

**APPLICANT:** XAC Automation Corporation

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SCIENCE-BASED INDUSTRIAL PARK,  
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**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF110613E06	Original release	July 12, 2011




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## 1 CERTIFICATION

**PRODUCT :** Handheld PINpad  
**BRAND NAME :** First Data  
**MODEL NO. :** FD35, FD-35-ZKA  
**TEST SAMPLE :** ENGINEERING SAMPLE  
**APPLICANT :** XAC Automation Corporation  
**TESTED :** June 16 to 24, 2011  
**STANDARDS :** 47 CFR Part 15, Subpart C(Section 15.225)  
ANSI C63.4: 2003  
NSI C63.10-2009

The above equipment (Model: FD35) 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:** July 12, 2011  
( Claire Kuan, Specialist )

**APPROVED BY :**  , **DATE:** July 12, 2011  
( May Chen, Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: FCC Part 15, Subpart C</b>			
<b>STANDARD PARAGRAPH</b>	<b>TEST TYPE</b>	<b>RESULT</b>	<b>REMARK</b>
15.207	Conducted Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -19.39dB at 0.150MHz
15.225 / 15.209	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -3.70 dB at 131.96 MHz
15.225 / 15.215	Operating Frequency Measurement	PASS	Operation within the band 13.110-14.010 MHz
15.225(e)	Frequency Stability Measurement	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	No antenna connector is used.

## 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	2.45 dB
Radiated emissions (30MHz-1GHz)	3.89 dB

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Handheld PINpad
<b>MODEL NO.</b>	FD35, FD-35-ZKA
<b>FCC ID</b>	MQT-FD35
<b>POWER SUPPLY</b>	DC 5V from host equipment
<b>MODULATION TYPE</b>	ASK
<b>OPERATING FREQUENCY</b>	13.56MHz
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	PCB (2 Layer) antenna(Gain: 13dBi)
<b>DATA CABLE</b>	MINI DIN(F) cable (Unshielded, 1.1m with one core)
<b>I/O PORTS</b>	MINI DIN(F) port x 1
<b>ASSOCIATED DEVICES</b>	NA

#### NOTE:

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

Brand	Model	Difference
First Data	FD-35	Keycap cover to be secured with EUT by snap-fit devices.
	FD-35-ZKA	Keycap cover to be secured with EUT by ultrasonic welding.

From the above models, model: **FD-35** was selected as representative model for the test and its data was recorded in this report.

2. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

#### 3.2 DESCRIPTION OF TEST MODES

The EUT only has 1 channel.

CHANNEL	FREQUENCY (MHz)
1	13.56





### 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:

**47 CFR Part 15, Subpart C (Section 15.225)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

All tests 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.

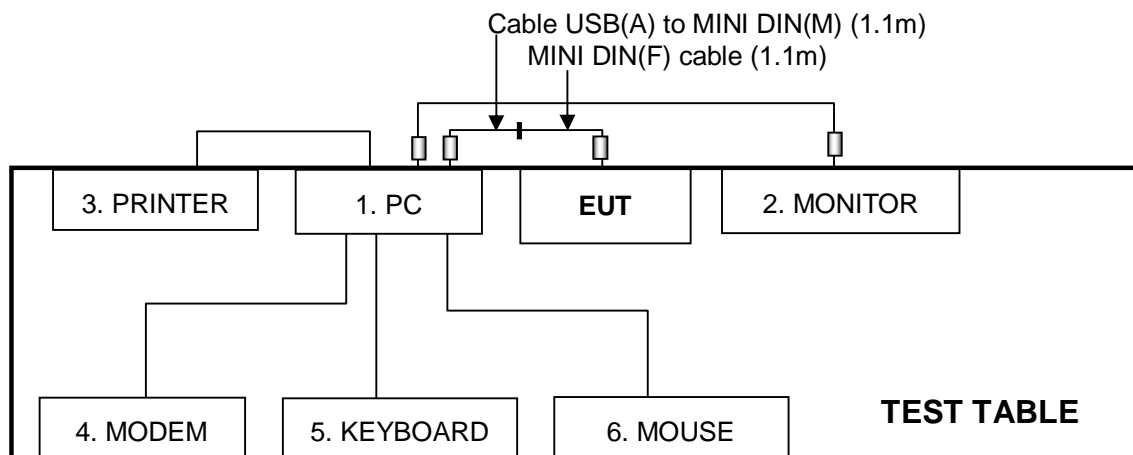
Conducted test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	PERSONAL COMPUTER	DELL	DCSCMF	CKKB32S	FCC DoC
2	MONITOR	DELL	E2210Hc	CN-OG337R-64180-97S -OQFS	FCC DoC
3	PRINTER	EPSON	LQ-300+	DCGY017079	FCC DoC
4	MODEM	ACEEX	1414	0206026779	IFAXDM1414
5	KEYBOARD	DELL	SK-8115	MY-0J4635-71619-67V-0 117	FCC DoC
6	MOUSE	DELL	MO56UO	349003988	FCC DoC
Radiated test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	iPod	Apple	A1137	6U6078CDUPR	FCC DoC

Conducted test	
No.	Signal cable description
1	MINI DIN(F) cable (Unshielded, 1.1m with one core) / Cable USB(A) to MINI DIN(M) (1.1m with one core)
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w. 2 cores
3	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	2m foil shielded wire, USB Connector, with one core
6	1.8 m foil shielded wire, terminated with USB connector via drain wire, w/o core.
Radiated test	
No.	Signal cable description
1	USB Cable with one core(1.2m)
2	NA

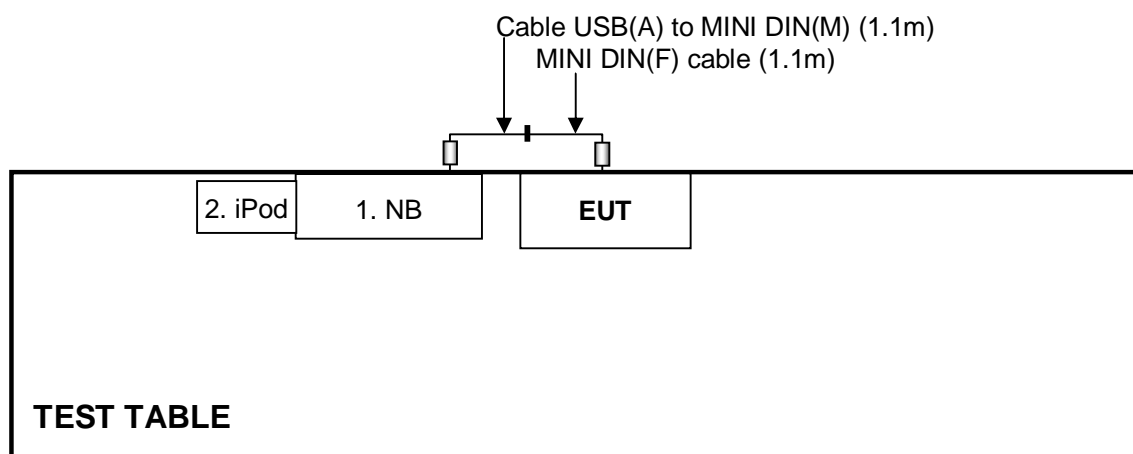
Note: 1. All power cords of the above support units are unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

For conducted test:



For radiated test:





## 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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. 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
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 02, 2011	Mar. 01, 2012
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 17, 2010	Sep. 16, 2011
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 10, 2011	June 09, 2012
RF Cable (JYEBAO)	5DFB	CONCAB-003	Aug. 06, 2010	Aug. 05, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

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

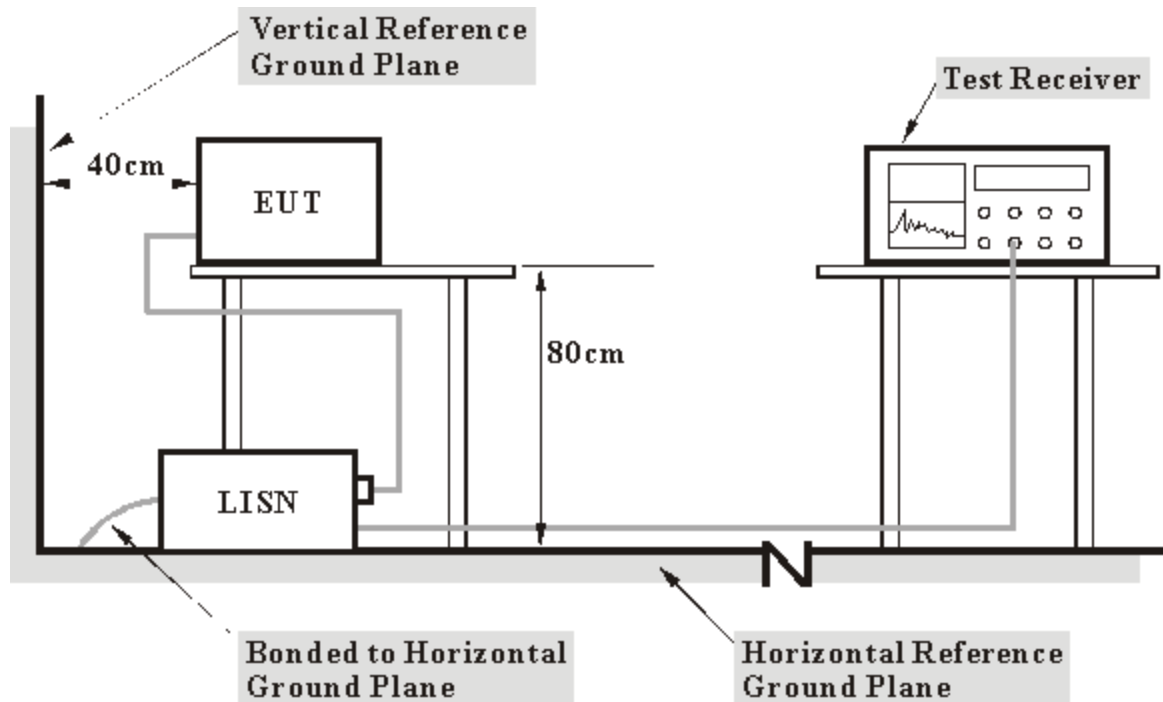
#### 4.1.3 TEST PROCEDURES

- 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 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

#### 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) 80 cm from EUT and at the least 80 cm 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

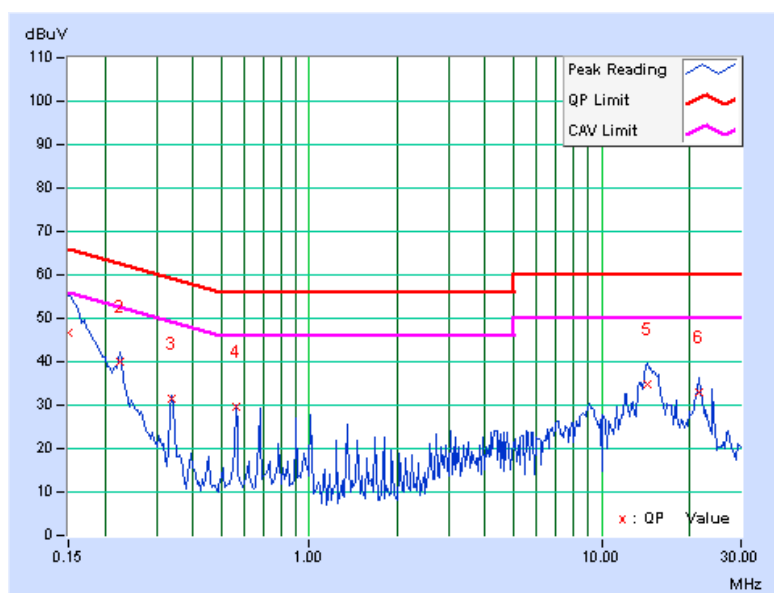
1. Turn on the power of all equipment.
2. Support unit 1 (PC) runs a test program "Runin.exe" to enable of EUT via one MINI DIN(F) cable and one CABLE USB(A) to MINI DIN(M) cable continuously.

#### 4.1.7 TEST RESULTS

<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>6DB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	27 deg. C, 62%RH, 1005 hPa	<b>PHASE</b>	Line (L)
<b>TESTED BY</b>	Andy Ho		

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	0.150	0.37	46.24	-	46.61	-	66.00	56.00	-19.39	-
2	0.224	0.36	39.59	-	39.95	-	62.66	52.66	-22.71	-
3	0.338	0.36	31.01	-	31.37	-	59.26	49.26	-27.89	-
4	0.564	0.37	29.37	-	29.74	-	56.00	46.00	-26.26	-
5	14.359	0.96	33.96	-	34.92	-	60.00	50.00	-25.08	-
6	21.512	1.11	31.69	-	32.80	-	60.00	50.00	-27.20	-

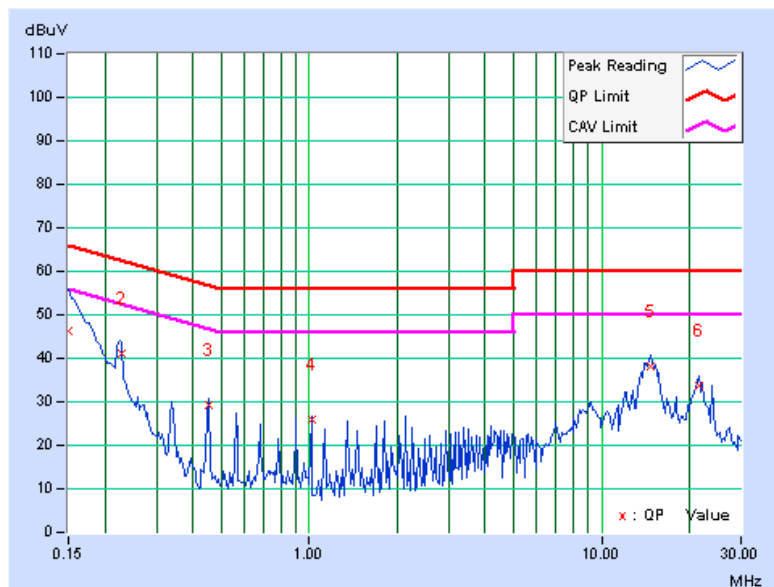
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>6DB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	23 deg. C, 64%RH, 965 hPa	<b>PHASE</b>	Neutral (N)
<b>TESTED BY</b>	Andy Ho		

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	0.150	0.10	46.27	-	46.37	-	66.00	56.00	-19.63	-
2	0.228	0.10	41.00	-	41.10	-	62.52	52.52	-21.42	-
3	0.451	0.11	29.15	-	29.26	-	56.86	46.86	-27.60	-
4	1.016	0.16	25.90	-	26.06	-	56.00	46.00	-29.94	-
5	14.691	0.91	37.07	-	37.98	-	60.00	50.00	-22.02	-
6	21.516	1.26	32.43	-	33.69	-	60.00	50.00	-26.31	-

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





## 4.2 RADIATED EMISSION & OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.225(a) the field strength of any emission within the band 13.553-13.567MHz should not exceed 15,848 micro-volts/meter at 30 meters.

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m) at 10m
13.553-13.567	103.1

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

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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 Radiated emission below 30MHz:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4443A	MY48250349	July 29, 2010	July 28, 2011
	E4443A	MY49420002	Aug. 11, 2010	Aug. 10, 2011
Agilent Pre-Selector	N9039A	MY46520331	Aug. 11, 2010	Aug. 10, 2011
	N9039A	MY46520309	July 29, 2010	July 28, 2011
Agilent Signal Generator	N5181A	MY49060520	Aug. 12, 2010	Aug. 11, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-01	Nov. 16, 2010	Nov. 15, 2011
	ZFL-1000VH2B	AMP-ZFL-02	Nov. 16, 2010	Nov. 15, 2011
R&S Loop Antenna	HFH2-Z2	100070	Feb. 03, 2011	Feb. 02, 2012
RF CABLE	NA	RF104-110 RF104-206 RF104-209	Dec. 22, 2010	Dec. 21, 2011
RF Cable	8DFB	CHFCAB-001 CHFCAB-002 CHFCAB-003	Nov. 16, 2010	Nov. 15, 2011
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	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 test was performed in 10m Chamber No. F.  
3. The FCC Site Registration No. is 928149.  
4. The VCCI Site Registration No. is R-3252 & G-136.  
5. The CANADA Site Registration No. is IC 7450H-1.



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**For Radiated emission 30~1000MHz:**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250253	Aug. 23, 2010	Aug. 22, 2011
Agilent Pre-Selector	N9039A	MY46520310	Aug. 23, 2010	Aug. 22, 2011
Agilent Signal Generator	N5181A	MY49060347	July 30, 2010	July 29, 2011
LIG NEX1 Test Receiver	ER-265	L09068005	Oct. 25, 2010	Oct. 24, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-04	Nov. 16, 2010	Nov. 15, 2011
RF CABLE	NA	RF104-205 RF104-207 RF104-202	Dec. 28, 2010	Dec. 27, 2011
RF Cable	NA	CHHCAB_001	NA	NA
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	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 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.

### 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 below 1GHz.



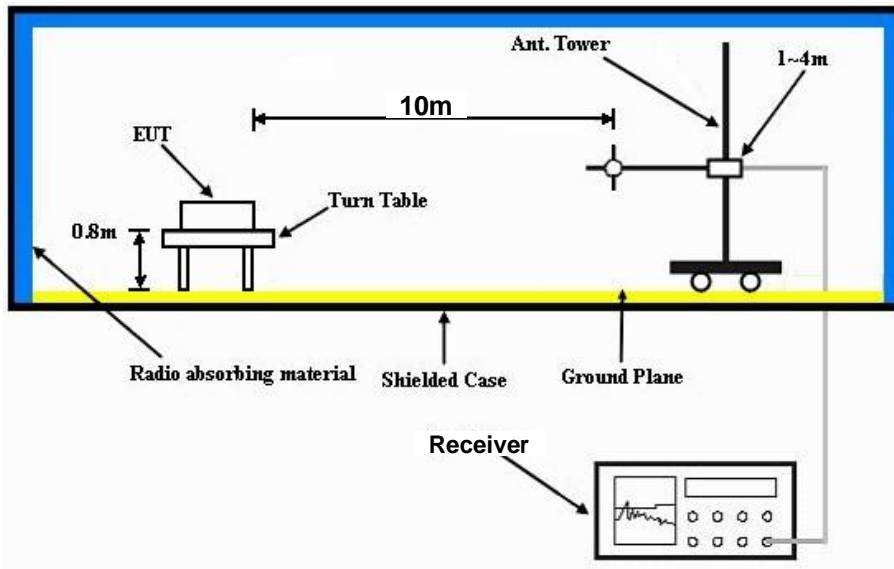
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#### 4.2.4 DEVIATION FROM TEST STANDARD

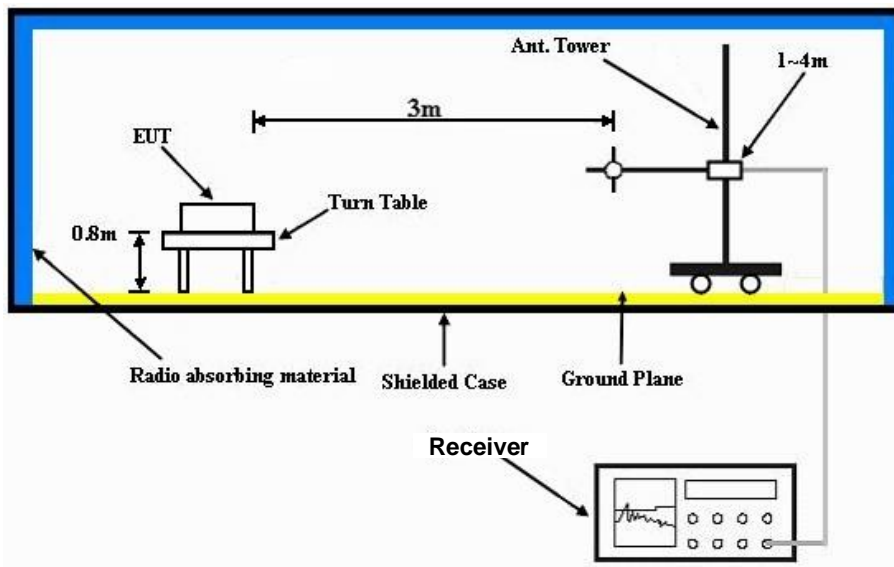
No deviation

#### 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 (RADIATED EMISSION BELOW 30MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	9KHz - 30MHz
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH 1005hPa	DETECTOR FUNCTION	Quasi-Peak (QP)
TESTED BY	Rex Huang		

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	43.5 QP	103.1	-59.6	1.5	162	43.5	0.0
2	27.12	23.5 QP	48.6	-25.1	1.5	243	23.5	0.0
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	45.7 QP	103.1	-57.4	1.5	13	45.7	0.0
2	27.12	24.7 QP	48.6	-23.9	1.5	315	24.7	0.0

- 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.



## 4.2.8 TEST RESULTS (RADIATED EMISSION 30~1000MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 70%RH 1005hPa	DETECTOR FUNCTION	Quasi-Peak
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	124.03	37.50 QP	43.50	-6.00	1.75 H	284	24.77	12.73
2	131.96	39.80 QP	43.50	-3.70	2.00 H	256	26.40	13.40
3	180.04	37.63 QP	43.50	-5.87	1.75 H	49	24.90	12.73
4	246.12	39.43 QP	46.00	-6.57	1.25 H	285	26.53	12.90
5	278.81	41.33 QP	46.00	-4.67	1.00 H	291	27.05	14.28
6	609.09	41.21 QP	46.00	-4.79	1.25 H	277	19.56	21.65
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	120.00	37.63 QP	43.50	-5.87	1.25 V	360	25.24	12.39
2	131.96	37.95 QP	43.50	-5.55	1.50 V	0	24.55	13.40
3	298.23	35.54 QP	46.00	-10.46	2.00 V	301	20.44	15.10
4	403.15	32.70 QP	46.00	-13.30	1.25 V	360	15.31	17.39
5	608.85	32.57 QP	46.00	-13.43	1.25 V	237	10.92	21.65
6	699.21	32.92 QP	46.00	-13.08	1.50 V	312	10.78	22.14

- 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 OPERATING FREQUENCY MEASUREMENT

#### 4.3.1 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated DATE	Calibrated Until
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

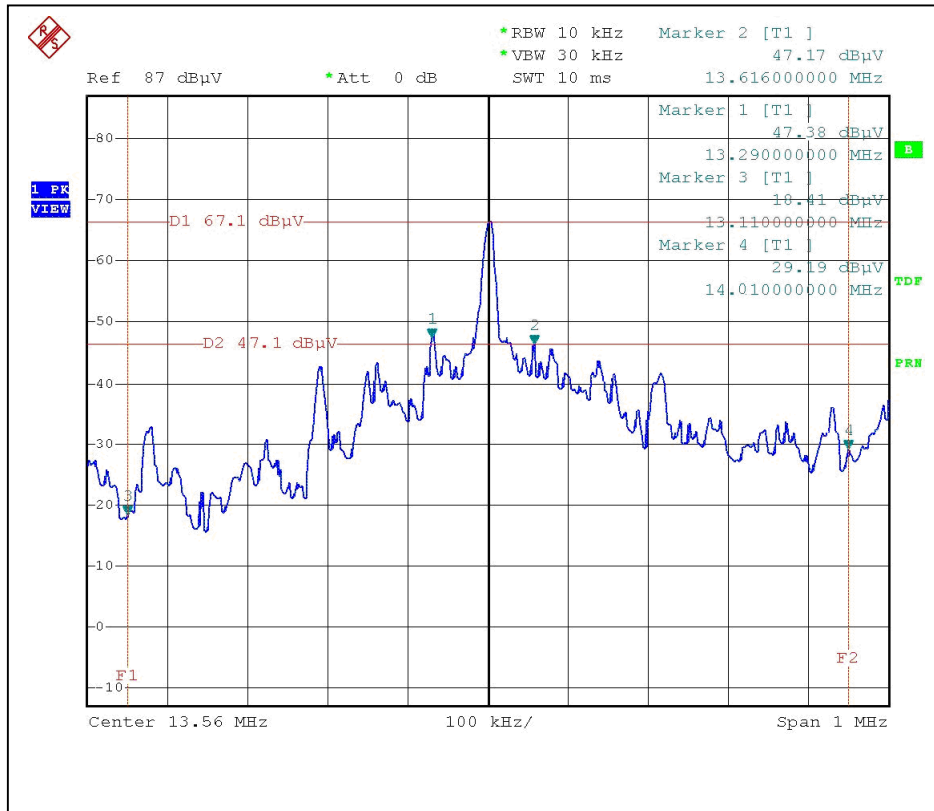
**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.2 EUT OPERATING CONDITION

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

### 4.3.3 TEST RESULTS

The EUT was operation within the band 13.110-14.010 MHz.





## 4.4 FREQUENCY STABILITY

### 4.4.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

According to FCC 47 CFR Section 15.225(e), the frequency tolerance of the carrier signal shall be maintained within +/- 0.01% 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
R&S Spectrum Analyzer	FSP 40	100060	May 11, 2011	May 10, 2012

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

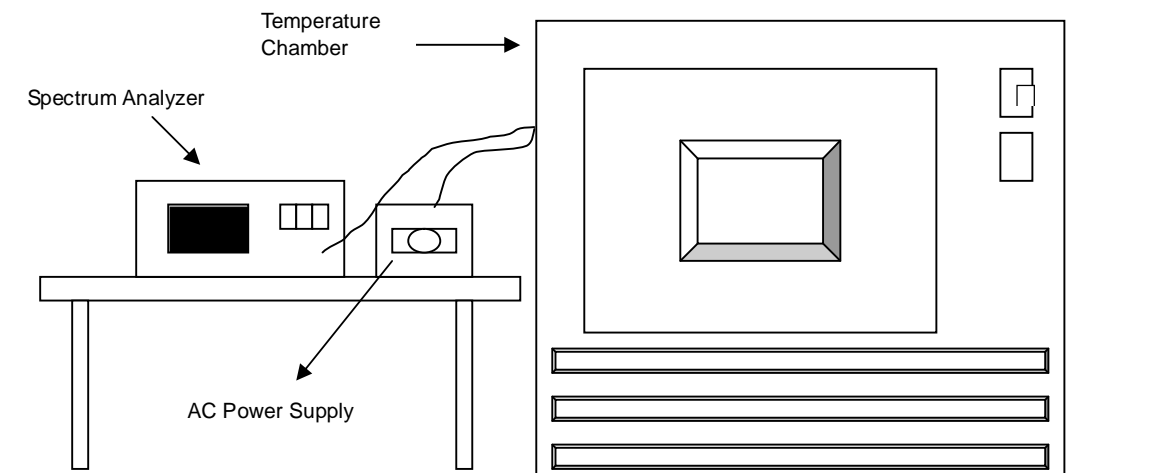
### 4.4.3 TEST PROCEDURE

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

Operating frequency: 13.56MHz									
Temp. (°C)	Power supply (VAC)	0 minute		2 minute		5 minute		10 minute	
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm
50	138	13.560173	12.7581	13.560145	10.6932	13.560087	6.4159	13.560129	9.5133
	120	13.560173	12.7581	13.560141	10.3982	13.560077	5.6785	13.560119	8.7758
	102	13.560166	12.2419	13.560127	9.3658	13.560091	6.7109	13.560128	9.4395
40	138	13.559767	-17.1829	13.559746	-18.7316	13.559717	-20.8702	13.559728	-20.0590
	120	13.559773	-16.7404	13.559738	-19.3215	13.559722	-20.5015	13.559734	-19.6165
	102	13.559776	-16.5192	13.559741	-19.1003	13.55971	-21.3864	13.559728	-20.0590
30	138	13.559992	-0.5900	13.560049	3.6136	13.560071	5.2360	13.560091	6.7109
	120	13.560002	0.1475	13.56004	2.9499	13.560077	5.6785	13.560079	5.8260
	102	13.559986	-1.0324	13.560047	3.4661	13.560067	4.9410	13.560083	6.1209
20	138	13.560116	8.5546	13.560099	7.3009	13.56015	11.0619	13.560167	12.3156
	120	13.560118	8.7021	13.5601	7.3746	13.560155	11.4307	13.560159	11.7257
	102	13.560102	7.5221	13.560091	6.7109	13.560141	10.3982	13.560172	12.6844
10	138	13.559888	-8.2596	13.559854	-10.7670	13.559833	-12.3156	13.559822	-13.1268
	120	13.559881	-8.7758	13.559858	-10.4720	13.559831	-12.4631	13.559828	-12.6844
	102	13.559884	-8.5546	13.559854	-10.7670	13.559838	-11.9469	13.559824	-12.9794
0	138	13.56004	2.9499	13.560086	6.3422	13.560057	4.2035	13.560087	6.4159
	120	13.560023	1.6962	13.56008	5.8997	13.560072	5.3097	13.56008	5.8997
	102	13.560041	3.0236	13.560087	6.4159	13.560058	4.2773	13.560072	5.3097
-10	138	13.5601	7.3746	13.560136	10.0295	13.560121	8.9233	13.560154	11.3569
	120	13.560119	8.7758	13.560142	10.4720	13.560123	9.0708	13.560155	11.4307
	102	13.560111	8.1858	13.560134	9.8820	13.560123	9.0708	13.560163	12.0206
-20	138	13.559961	-2.8761	13.560004	0.2950	13.560005	0.3687	13.560023	1.6962
	120	13.55997	-2.2124	13.560013	0.9587	13.560007	0.5162	13.560024	1.7699
	102	13.559975	-1.8437	13.56	0.0000	13.560015	1.1062	13.560033	2.4336
-30	138	13.559863	-10.1032	13.55984	-11.7994	13.559844	-11.5044	13.559808	-14.1593
	120	13.559859	-10.3982	13.559842	-11.6519	13.559845	-11.4307	13.559807	-14.2330
	102	13.559865	-9.9558	13.559857	-10.5457	13.559848	-11.2094	13.559801	-14.6755



## 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.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml).  
If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

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**Web Site:** [www.adt.com.tw](http://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 ---**