



## STC Test Report

Date : 2011-01-18

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No. : HM165758

**Applicant (SUG022):**

AFFILIATED COMPUTER SERVICES SOLUTIONS  
FRANCE SAS  
Rue Claude Chappe, 07500 GUILHERAND-GRANGES,  
FRANCE

**Manufacturer:**

AFFILIATED COMPUTER SERVICES SOLUTIONS  
FRANCE SAS  
Rue Claude Chappe, 07500 GUILHERAND-GRANGES,  
FRANCE

**Description of Sample(s):**

Submitted sample(s) said to be  
Product: Interactive Contactless Validator  
Brand Name: VPE420  
Model Number: n°0001  
FCC ID: U36-VPE420

**Date Sample(s) Received:** 2010-09-21

**Date Tested:** 2010-10-06 to 2011-01-04

**Investigation Requested:**

Perform ElectroMagnetic Interference measurement in  
accordance with FCC 47CFR [Codes of Federal Regulations]  
Part 15: 2009 and ANSI C63.4:2009 for FCC Certification.

**Conclusion(s):**

The submitted product COMPLIED with the requirements of  
Federal Communications Commission [FCC] Rules and  
Regulations Part 15. The tests were performed in accordance  
with the standards described above and on Section 2.2 in this  
Test Report.

**Remark(s):**

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Dr. LEE Kam Chuen

Authorized Signatory

ElectroMagnetic Compatibility Department

For and on behalf of

The Hong Kong Standards and Testing Centre Ltd.

**The Hong Kong Standards and Testing Centre Ltd.**

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong

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### **1.0 General Details**

#### **1.1 Equipment Under Test [EUT]**

##### **Description of Sample(s)**

Submitted sample(s) said to be

Product: Interactive Contactless Validator

Manufacturer: AFFILIATED COMPUTER SERVICES SOLUTIONS FRANCE SAS

Brand Name: VPE420

Model Number: n°0001

Input Voltage: 12Vd.c. or 24Vd.c. (The n°0001 is suitable for use in a bus and those connected to the battery of the vehicle.)

#### **1.2 Description of EUT Operation**

The Equipment Under Test (EUT) is an AFFILIATED COMPUTER SERVICES SOLUTIONS FRANCE SAS, Interactive Contactless Validator is radio equipment with a contactless card interface (13.56MHz with an internal antenna). The VPE 420 is a piece of equipment that is installed on buses and is to be used by passengers for the validation of magnetic tickets or contactless smart cards.

#### **1.3 Date of Order**

2010-09-21

#### **1.4 Submitted Sample(s):**

1 Sample

#### **1.5 Test Duration**

2010-10-06 to 2011-01-04

#### **1.6 Country of Origin**

France

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### **2.0 Technical Details**

#### **2.1 Investigations Requested**

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2009 Regulations and ANSI C63.4:2009 for FCC Certification.

#### **2.2 Test Standards and Results Summary Tables**

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.225	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.4:2009	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: N/A - Not Applicable

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### **3.0 Test Results**

#### **3.1 Emission**

##### **3.1.1 Radiated Emissions**

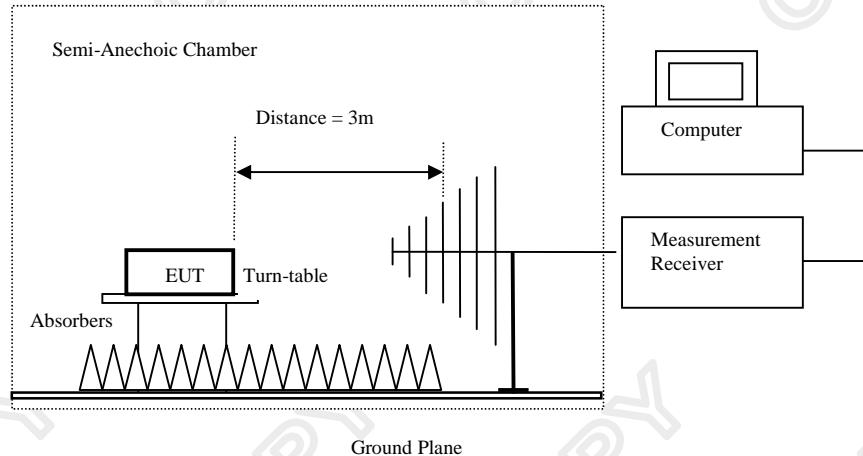
Test Requirement: FCC 47CFR 15.225  
Test Method: ANSI C63.4:2009  
Test Date: 2011-01-04  
Mode of Operation: Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC

#### **Test Method:**

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\* Semi-anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

#### **Test Setup:**



Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

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### Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.225]:

Frequency Range [MHz]	Field Strength [microvolts/meter at 3 meters]
13.553-13.567	Peak = 15,848,932.0 $\mu$ V/m Average = 1,584,893.0 $\mu$ V/m

Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (9kHz – 30MHz) – 12Vd.c.: Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
13.56	72.7	9.9	82.6	13,489.6	15,848,932	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
13.6	71.6	9.9	81.5	11,885.0	1,584,893	Horizontal
23.1	33.2	8.6	41.8	123.0	2,985	Horizontal
27.2	45.5	7.7	53.2	457.1	2,985	Horizontal
28.7	46.5	7.3	53.8	489.8	2,985	Horizontal

Remarks:

\*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty	:	9kHz to 30MHz	1.8dB
		30MHz to 1GHz	5.2dB
		1GHz to 18GHz	5.1dB

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### Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.225]:

Frequency Range [MHz]	Field Strength [microvolts/meter at 3 meters]
13.553-13.567	Peak = 15,848,932.0 $\mu$ V/m Average = 1,584,893.0 $\mu$ V/m

Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (9kHz – 30MHz) – 24Vd.c.: Pass

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
13.56	73.2	9.9	83.1	14,288.9	15,848,932	Horizontal

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
13.6	71.4	9.9	81.3	11,614.5	1,584,893	Horizontal
22.8	30.5	8.7	39.2	91.2	2,985	Horizontal
26.0	35.7	7.9	43.6	151.4	2,985	Horizontal
27.4	40.4	7.6	48.0	251.2	2,985	Horizontal
28.2	40.0	7.3	47.3	231.7	2,985	Horizontal

#### Remarks:

\*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty	:	9kHz to 30MHz	1.8dB
		30MHz to 1GHz	5.2dB
		1GHz to 18GHz	5.1dB

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### **Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### **Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (30MHz – 1000MHz) – 12Vd.c.: Pass**

Field Strength of Fundamental Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
30.6	20.8	17.2	38.0	79.4	100	Vertical
39.0	22.5	14.6	37.1	71.6	100	Vertical
101.9	24.4	8.7	33.1	45.2	150	Vertical
312.0	20.8	14.4	35.2	57.5	200	Vertical
352.6	19.9	15.9	35.8	61.7	200	Horizontal
399.0	21.8	16.4	38.2	81.3	200	Horizontal

#### Remarks:

\*: Denotes restricted band of operation.  
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : 9kHz to 30MHz 1.8dB  
30MHz to 1GHz 5.2dB  
1GHz to 18GHz 5.1dB

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**Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (1000MHz – 4000MHz) – 12Vd.c.: Pass**

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
1170.00	26.5	30.8	57.3	732.8	5,000	Vertical
1410.00	19.0	31.2	50.2	323.6	5,000	Vertical
2500.00	17.6	37.3	54.9	555.9	5,000	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
1170.00	18.4	30.8	49.2	288.4	500	Vertical
1410.00	12.2	31.2	43.4	147.9	500	Vertical
2500.00	11.9	37.3	49.2	288.4	500	Vertical

Remarks:

\*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : 9kHz to 30MHz 1.8dB  
30MHz to 1GHz 5.2dB  
1GHz to 18GHz 5.1dB

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### **Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:**

Frequency Range [MHz]	Quasi-Peak Limits [ $\mu$ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

### **Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (30MHz – 1000MHz) – 24Vd.c.: Pass**

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @ 3m $\mu$ V/m	E-Field Polarity
39.5	23.5	14.6	38.1	80.4	100	Vertical
52.4	23.2	11.6	34.8	55.0	100	Vertical
60.0	26.4	7.8	34.2	51.3	100	Vertical
101.1	22.3	8.8	31.1	35.9	150	Horizontal
430.6	17.4	18.9	36.3	65.3	200	Horizontal
500.7	17.7	19.4	37.1	71.6	200	Horizontal

#### Remarks:

\*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty	:	9kHz to 30MHz	1.8dB
		30MHz to 1GHz	5.2dB
		1GHz to 18GHz	5.1dB

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**Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC (1000MHz – 4000MHz) – 24Vd.c.: Pass**

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
1309.20	20.8	30.9	51.7	384.6	5,000	Vertical
1408.70	20.2	31.2	51.4	371.5	5,000	Vertical
1466.10	19.2	31.4	50.6	338.8	5,000	Vertical

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dB $\mu$ V/m	Correction Factor dB $\mu$ V/m	Field Strength dB $\mu$ V/m	Field Strength $\mu$ V/m	Limit @3m $\mu$ V/m	E-Field Polarity
1309.20	15.3	30.9	46.2	204.2	500	Vertical
1408.70	17.5	31.2	48.7	272.3	500	Vertical
1466.10	15.6	31.4	47.0	223.9	500	Vertical

Remarks:

\*: Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty	:	9kHz to 30MHz	1.8dB
		30MHz to 1GHz	5.2dB
		1GHz to 18GHz	5.1dB

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### **Frequency Tolerance [FCC 47 CFR 15.225]:**

Ambient Temperature: 20°C

Relative Humidity: 49%

Nominal transmit frequency: 13.56205MHz

### **Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC – 12Vd.c.: Pass**

Test conditions		Carrier Frequency		
		Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency Drift (%)
T = 20°C	Voltage = 12.0V	13.56205	---	---
	Voltage = 10.2V	13.56205	0.00	0.0000
	Voltage = 13.8V	13.56201	-0.04	-0.0003
T = 50°C	Voltage = 12.0V	13.56221	0.16	0.0012
T = 40°C	Voltage = 12.0V	13.56221	0.16	0.0012
T = 30°C	Voltage = 12.0V	13.56217	0.12	0.0009
T = 10°C	Voltage = 12.0V	13.56205	0.00	0.0000
T = 0°C	Voltage = 12.0V	13.56202	0.03	-0.0002
T = -10°C	Voltage = 12.0V	13.56200	-0.05	-0.0004
T = -20°C	Voltage = 12.0V	13.56199	-0.06	-0.0004
Measurement uncertainty		< ±1 * 10 <sup>-7</sup>		

LIMIT 0.01% of carrier Frequency at Normal Temperature and supply voltage.

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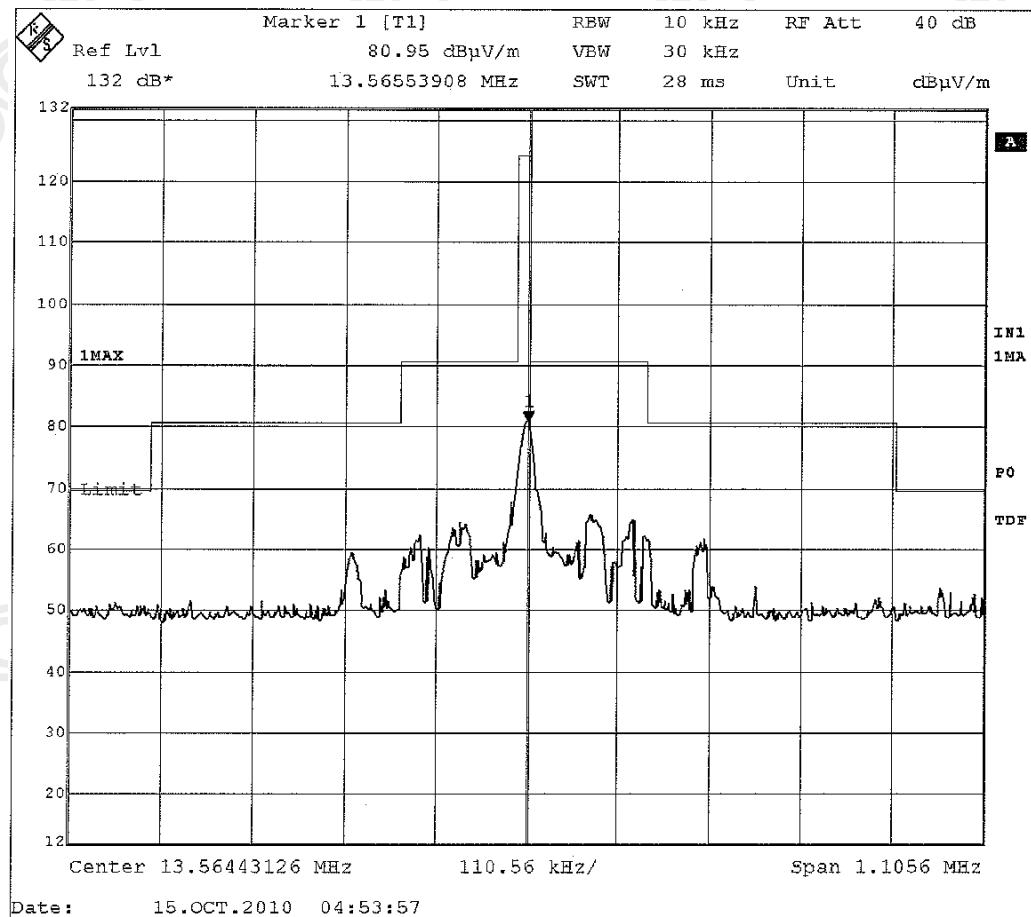
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### Frequency Tolerance [FCC 47 CFR 15.225]:

**Mode of operation: Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC – 12Vd.c.**



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### Frequency Tolerance [FCC 47 CFR 15.225]:

Ambient Temperature: 20°C

Relative Humidity: 51%

Nominal transmit frequency: 13.56213MHz

### Results of Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC – 24Vd.c.: Pass

Test conditions		Carrier Frequency		
		Carrier Frequency (MHz)	Frequency Drift (kHz)	Frequency Drift (%)
T = 20°C	Voltage = 24.0V	13.56213	---	---
	Voltage = 20.4V	13.56217	0.04	0.0003
	Voltage = 27.6V	13.56204	-0.09	-0.0007
T = 50°C	Voltage = 24.0V	13.56211	-0.02	-0.0001
T = 40°C	Voltage = 24.0V	13.56211	0.16	0.0012
T = 30°C	Voltage = 24.0V	13.56218	0.13	0.0010
T = 10°C	Voltage = 24.0V	13.56212	-0.01	-0.0001
T = 0°C	Voltage = 24.0V	13.56210	-0.03	-0.0002
T = -10°C	Voltage = 24.0V	13.56207	-0.06	-0.0004
T = -20°C	Voltage = 24.0V	13.56208	-0.05	-0.0004
Measurement uncertainty		$< \pm 1 * 10^{-7}$		

LIMIT      0.01% of carrier Frequency at Normal Temperature and supply voltage.

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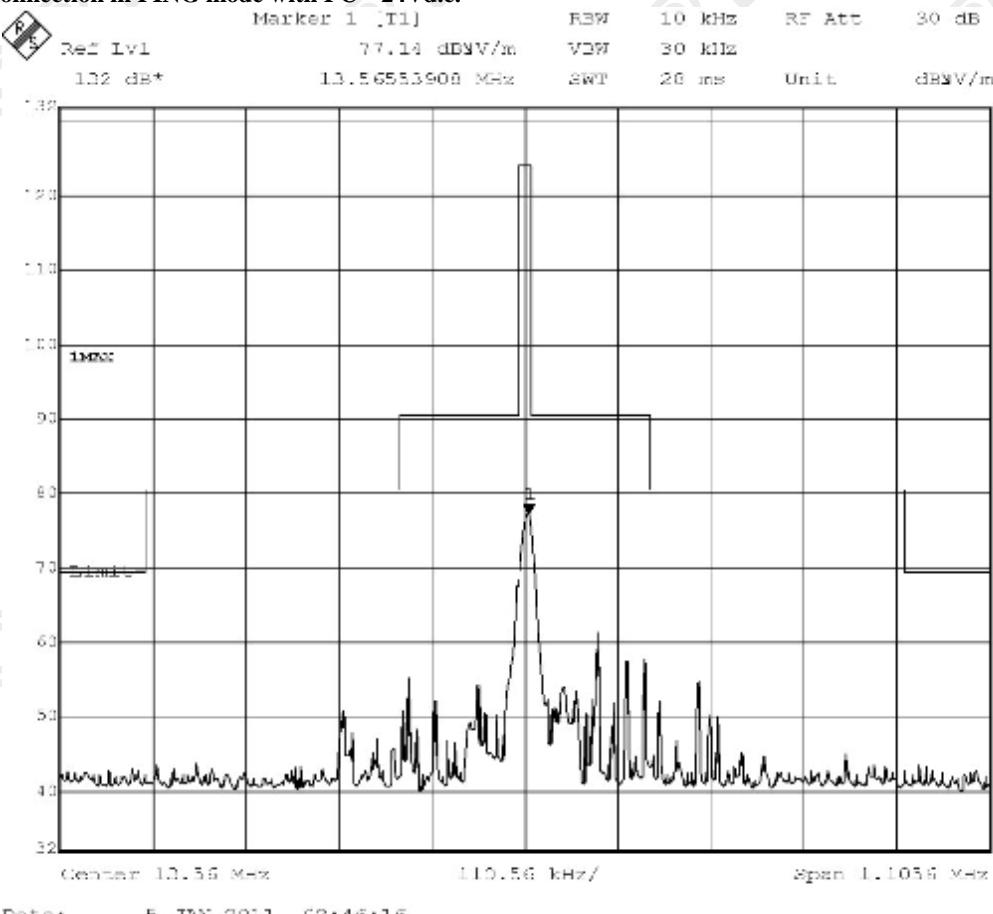
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### Frequency Tolerance [FCC 47 CFR 15.225]:

**Mode of operation: Tx mode, Self Test mode, Tag reading and writing mode and Ethernet connection in PING mode with PC – 24Vd.c.**



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### Appendix A

#### List of Measurement Equipment

##### Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2009/09/02	2011/09/02
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2008/12/01	2011/12/01
EM083	STCOATS	--	--	--	2008/12/08	2011/12/08
EM174	BICONILOG ANTENNA	EMCO	3142B	1671	2010/02/09	2012/02/09
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2009/01/06	2011/01/06
EM229	EMI Test Receiver	R&S	ESIB40	100248	2009/09/27	2010/09/27
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2010/07/01	2011/07/01
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	2010/01/17	2011/01/17
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/07/26	2011/07/26

#### Ancillary Equipment

ITEM NO.	DESCRIPTION	MODEL NO.	FCC ID	REMARK
1	IBM NOTEBOOK	ThinkPad T400	N/A	P8700/3M/2.53GHz C2D; 2G DDR3 RAM, 320GB HDD, DVD+/-RW, 14.1" WXGA, Intel X4500, 1.3M Web Cam, Intel 5100 AGN, BT, FPR, 6CELL, Eng/TC(C&L)Win 7 Pro(EE), 2GB DDR3-1066 SO-DIMM Memory
2	DELL MONITOR	E551C	ARSCM356N	RESOLUTION:800x600(DURING TESTING) 1.0M UNSHIELDED POWER CORD CONNECTED TO THE COMPUTER 2.8M SHIELDED CABLE CONNECTED TO THE COMPUTER
4	DELL MOUSE	N/A	N/A	2.4M UNSHIELDED CABLE CONNECTED TO THE COMPUTER

#### Remarks:-

CM      Corrective Maintenance

N/A      Not Applicable

TBD      To Be Determined

#### **The Hong Kong Standards and Testing Centre Ltd.**

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### Appendix B

#### Photographs of EUT

Front View of the product



Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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### **Photographs of EUT**

**Measurement of Radiated Emission Test Set Up**



\*\*\*\*\* End of Test Report \*\*\*\*\*

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