



NVLAP LAB CODE 200707-0



# FCC PART 15.225

## EMI MEASUREMENT AND TEST REPORT

For

### Advanced Card Systems Limited

Units 2010-2013, 20<sup>th</sup> Floor, Chevalier Commercial Centre,  
8 Wang Hoi Road, Kowloon Bay, Hong Kong.

**FCC ID: V5MEH880**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Smart Card Terminal
<b>Test Engineer:</b> Phoenix Liu	<i>Phoenix Liu</i>
<b>Report Number:</b> RSZ09120102	
<b>Report Date:</b> 2010-01-08	
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**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government.  
\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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## GENERAL INFORMATION

### Product Description for Equipment Under Test (EUT)

The *Advanced Card Systems Limited*'s product, model number: *eH880-DP-CF* (FCC ID: V5MEH880) or the "EUT" as referred to in this report is a *Smart Card Terminal*. The EUT is measured approximately 16.4 cm L x 18.0 cm W x 8.8 cm H. rated input voltage: DC 12V adapter




#### Adapter Information:

Model: SAM180-12.0-1500US;

Input: AC 100-240V 50/60Hz 900mA;

Output: DC 12V 1500mA.

Note: The serial product model eH880-DP-CF/eH880-DP-CL, we select eH880-DP-CF to test. The two models are nearly identical, same PCBAs are used for both models, and same firmware can be used on both models. Also most of the casing parts are common; the differences between them are listed below:

	EH880 Fingerprint Version (eH880-DP-CF)	EH880 Generic Version (eH880-DP-CL)
1.	Front cover for Fingerprint Version 	Front Cover for Generic Version 
2.	Fingerprint module and the flat cable connected to the PCB	(Not installed)
3.	Fingerprint module holder consist of 2 transparent plastic parts and 3 screws 	(Not installed)

All of these were explained in the attached declaration letter.

\* All measurement and test data in this report was gathered from production sample serial number: 0912006 (Assigned by BAACL, Shenzhen). The EUT was received on 2009-12-01.

### Objective

This Type approval report is prepared on behalf of *Advanced Card Systems Limited* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

### Related Submittal(s)/Grant(s)

No Related Submittals.

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (ShenZhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21, 2007. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

### EUT Exercise Software

N/A.

### Equipment Modifications

Bay Area Compliance Laboratories Corp.(Shenzhen) has not done any modification on the EUT.

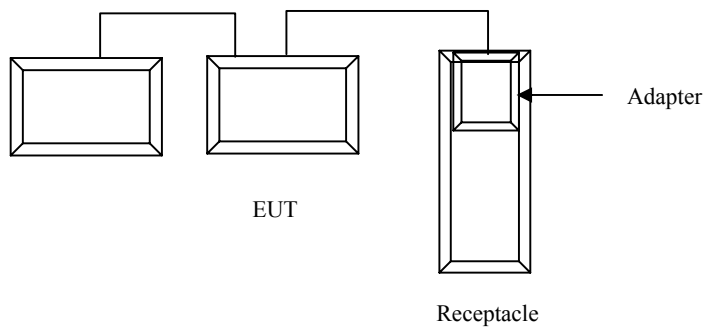
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
HP	Printer	C3941A	N/A	DOC

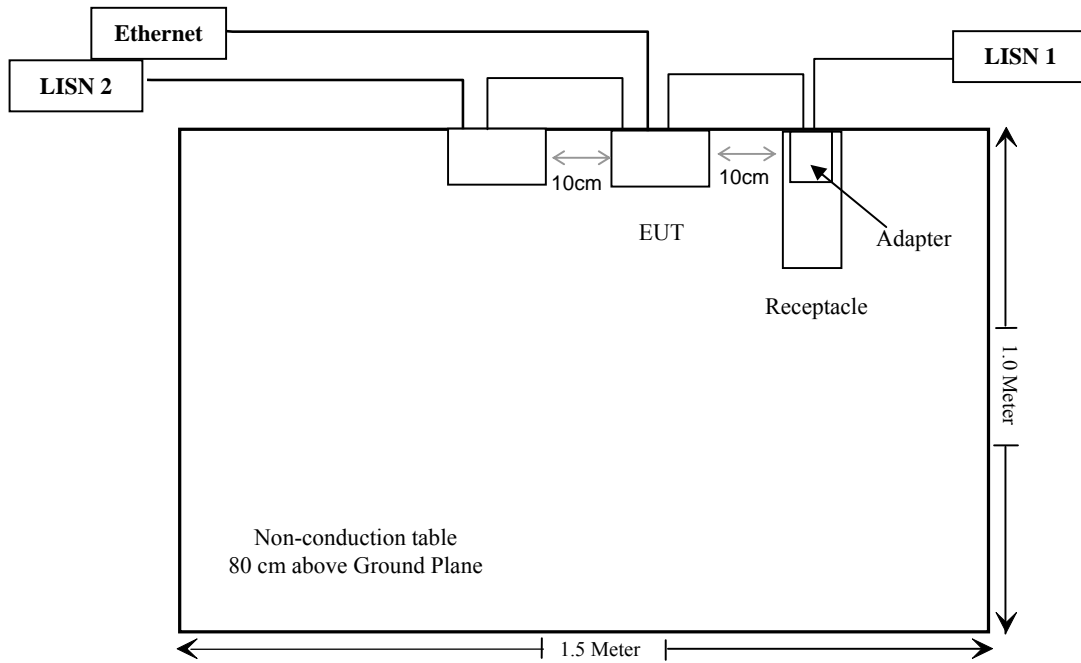
### External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Undetachable DC Power Cable with a Core	1.5	EUT	Adapter

### Configuration of Test Setup



### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of operation	Compliant
§15.207	Conducted Emission	Compliant
§15.209	Radiated Emission Test	Compliant*
§15.225(a) (b) (c) §15.31(f)	Field Strength of Radiated Emissions	Compliant
§15.225(d) §15.209, §15.31(f)	Out of Band Emission	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215(c)	20 dB Bandwidth Testing	Compliant

Note:\* Within measurement uncertainty.



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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Standard Applicable**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

### **Antenna Connected Construction**

The EUT has a printed loop antenna on PCB, which complies with the Part 15.203. Please see EUT photo for details.

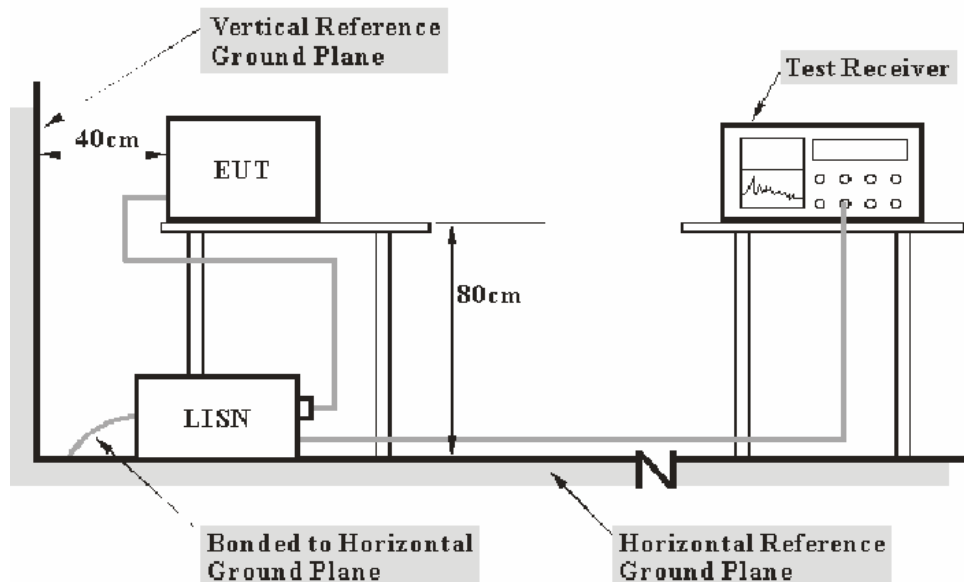
## FCC §15.207 - CONDUCTED EMISSION

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp.(Shenzhen) is  $\pm 2.4$  dB.

### EUT 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.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>IF B/W</i>
150 kHz – 30 MHz	9 kHz

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2009-04-28	2010-04-27
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2009-04-28	2010-04-27

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

### Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

**9.10 dB at 0.345 MHz in the Line conductor mode**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

The testing was performed by Phoenix Liu on 2009-12-26.

Test Mode: Reading Card

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dBµV)	Detector QP/AV	Conductor Line/Neutral	Limit (dBµV)	Margin (dB)
0.345	40.00	AV	Line	49.10	9.10
0.920	46.70	QP	Line	56.00	9.30
0.345	49.30	QP	Line	59.10	9.80
0.325	49.70	QP	Neutral	59.60	9.90
0.665	46.10	QP	Neutral	56.00	9.90
0.910	35.80	AV	Neutral	46.00	10.20
0.910	45.60	QP	Neutral	56.00	10.40
0.325	38.90	AV	Neutral	49.60	10.70
1.285	35.00	AV	Line	46.00	11.00
2.400	44.90	QP	Neutral	56.00	11.10
1.285	44.50	QP	Line	56.00	11.50
0.665	34.30	AV	Neutral	46.00	11.70
0.910	34.20	AV	Line	46.00	11.80
2.400	33.90	AV	Neutral	46.00	12.10
8.155	34.60	AV	Neutral	50.00	15.40
13.490	44.50	QP	Line	60.00	15.50
0.155	49.40	QP	Line	65.70	16.30
8.035	42.90	QP	Neutral	60.00	17.10
13.405	41.80	QP	Neutral	60.00	18.20
0.155	37.10	AV	Line	55.70	18.60
13.410	29.20	AV	Neutral	50.00	20.80
29.990	39.10	QP	Line	60.00	20.90
13.380	25.30	AV	Line	50.00	24.70
29.990	12.50	AV	Line	50.00	37.50

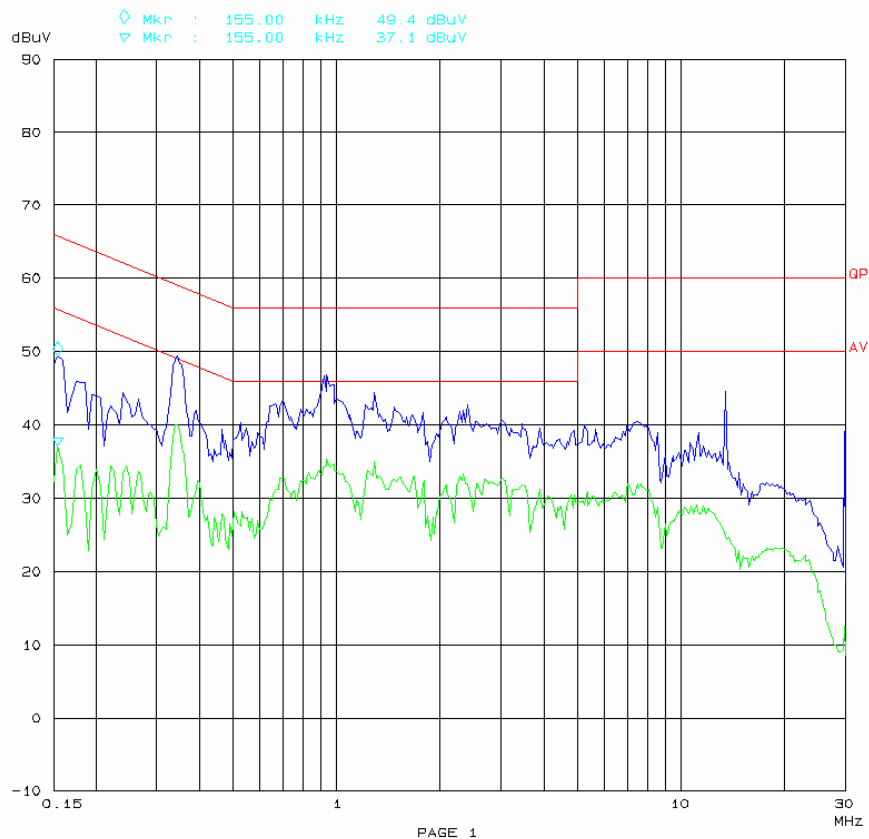
**Plot(s) of Test Data**

Plot(s) of Test Data is presented hereinafter as reference.

120 V, 60 Hz Line:

Conducted Emission  
FCC PART 15

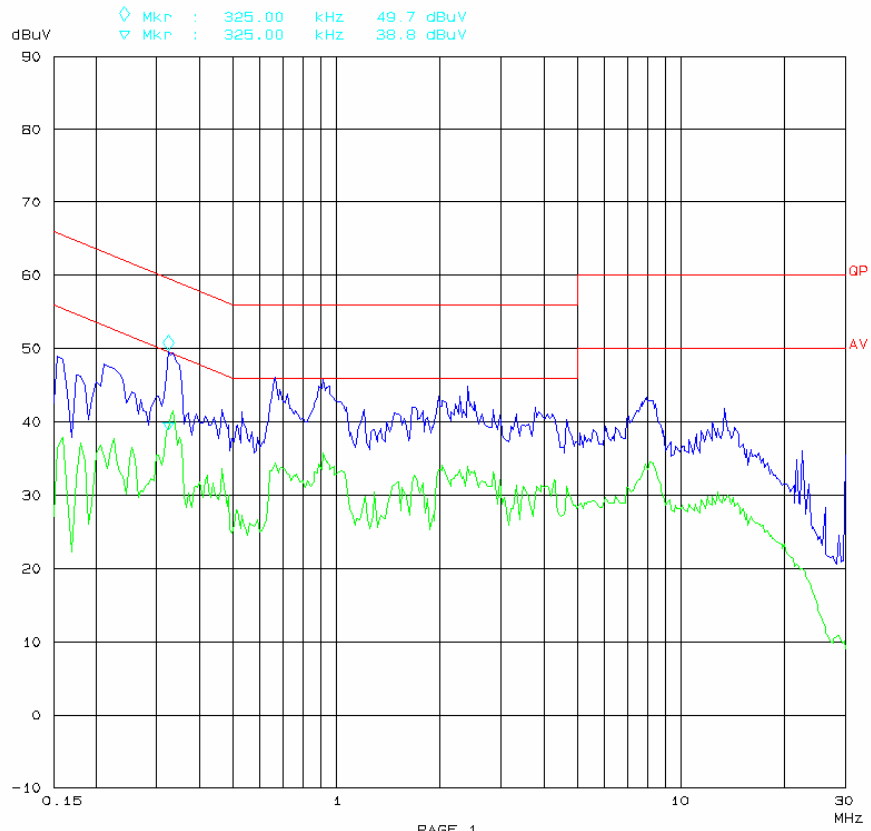
EUT: Smart card terminal M/N: eH880  
Manuf: advanced card  
Op Cond: Reading card  
Operator: Phoenix  
Test Spec: AC 120V/60Hz L  
Comment: Tem: 25 Hum: 55%  
BACL



**120 V, 60 Hz Neutral:**

Conducted Emission  
FCC PART 15

EUT: Smart card terminal M/N: eH880  
Manuf: advanced card  
Op Cond: Reading card  
Operator: Phoenix  
Test Spec: AC 120V/60Hz N  
Comment: Tem: 25 Hum: 56%  
BACL



## FCC §15.205 & §15.209 - RADIATED EMISSIONS TEST

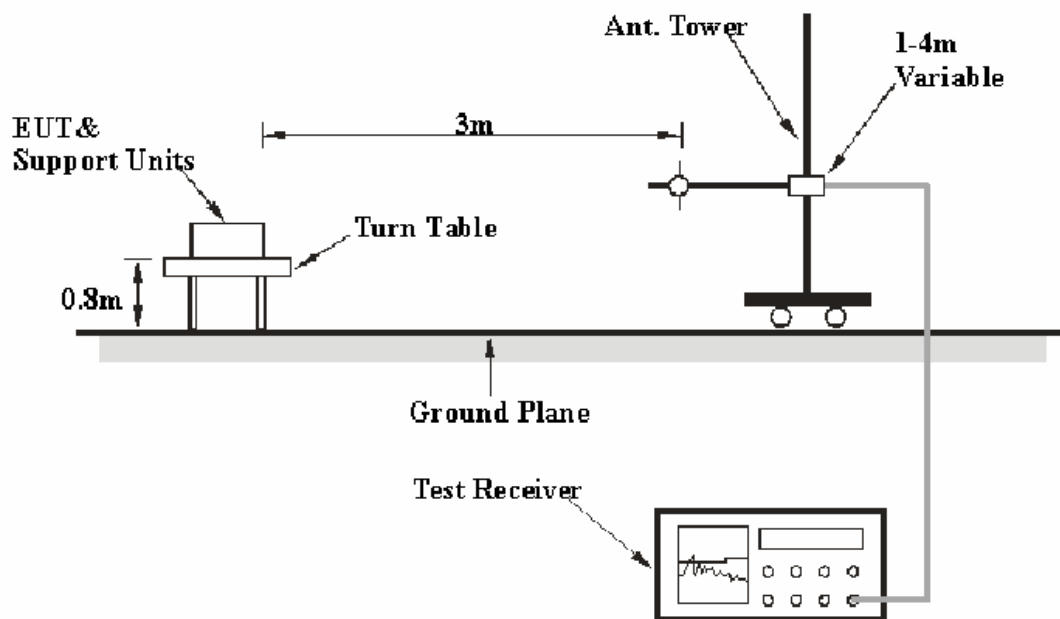
### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp.(Shenzhen) is  $\pm 4.0$  dB.

The fundamental data was recorded in average detection mode: set the VBW AVE on, then record the data.

### EUT Setup



The radiated emission tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30 – 1000 MHz	100 kHz	300 kHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2009-08-02	2010-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2009-03-11	2010-03-11
HP	Amplifier	8449B	3008A00277	2009-09-12	2010-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2009-05-05	2010-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2009-08-28	2010-08-27

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Cord. Amp.} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Cord. Amp.}$$

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 with the worst margin reading of:

**3.3 dB at 43.580000 in the Vertical polarization**



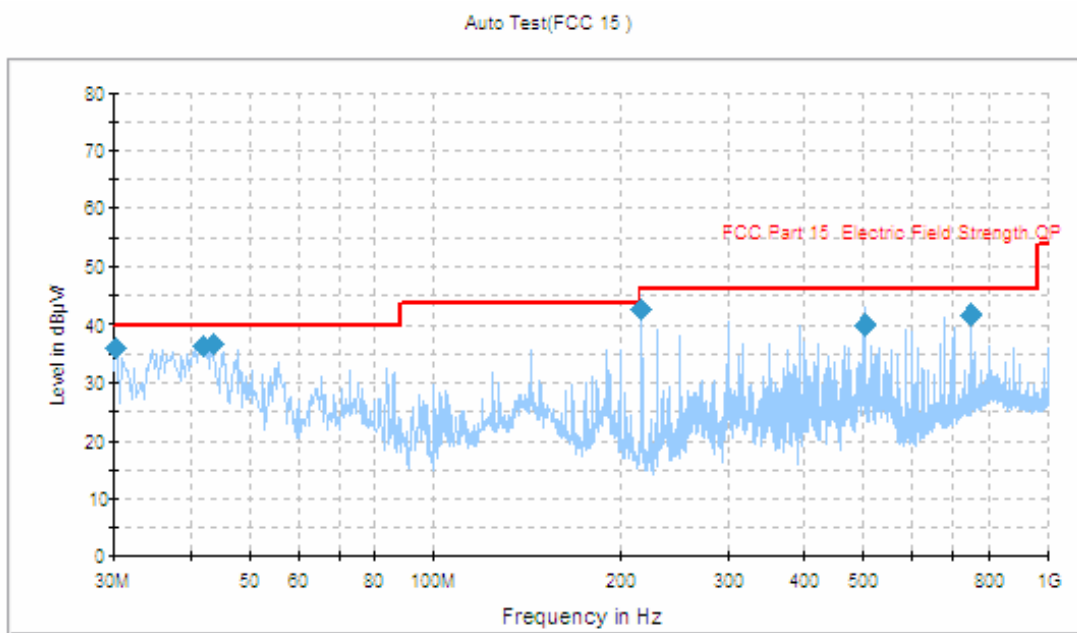
**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

The testing was performed by Phoenix Liu on 2009-12-29.

Test mode: Reading Card



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
43.580000	36.7	100.0	V	87.0	-7.4	40.0	3.3*
41.882500	36.6	100.0	V	127.0	-19.4	40.0	3.4*
30.242500	36.2	100.0	H	0.0	-6.1	40.0	3.8*
216.967500	42.1	202.0	V	6.0	-6.3	46.0	3.9*
750.225000	41.8	100.0	V	305.0	-4.5	46.0	4.2
500.207500	40.0	100.0	V	127.0	-5.4	46.0	6.0

Note: \* Within measurement uncertainty.

The spurious emission above 1 GHz which below the limit 20 dB was not recorded.

## FCC §15.225(a)(b)(c) & §15.31(f) – FIELD STRENGTH OF RADIATED EMISSIONS

### Applicable Standard

As per FCC Part 15.225

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

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2009-08-02	2010-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
ETS	Passive Loop Antenna	6512	00029604	2009-03-04	2010-03-04

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### EUT Setup

The field strength of radiated emissions tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### Test Data

#### Environmental Conditions

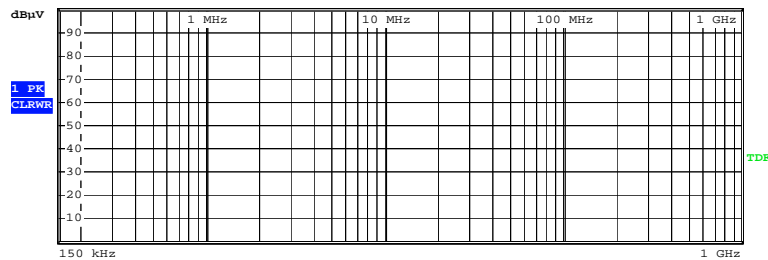
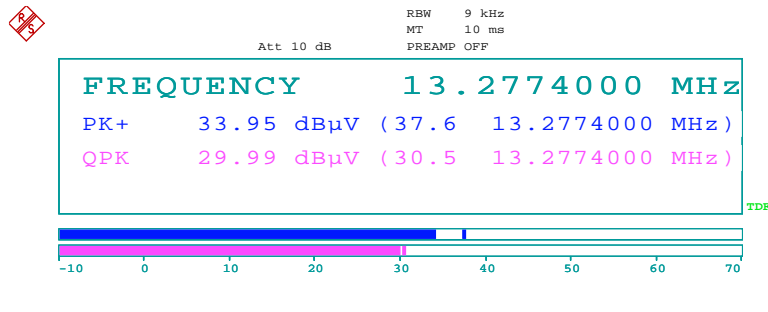
<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

*The testing was performed by Phoenix Liu on 2009-12-24.*

*Test Mode: Reading Card*

Test Result: Pass

Indicated		Table Angle Degree	Antenna Height (m)	Detector PK/QP/AV	Correction Factor			Cord. Amp. (dBµV/m) @ 3m	FCC Part 15.225	
Frequency Range (MHz)	Mark Point (MHz)				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBµV/m) @ 3m	Result
13.110-13.410	13.277	2	1.32	QP	32.1	0.20	0.0	30.5	80.5	Pass
13.410-13.553	13.492	0	1.31	QP	32.1	0.20	0.0	30.4	90.5	Pass
13.553-13.567	13.560	0	1.32	QP	32.1	0.20	0.0	50.2	124.0	Pass
13.567-13.710	13.567	0	1.30	QP	32.1	0.20	0.0	35.2	90.5	Pass
13.710-14.010	13.778	0	1.32	QP	32.1	0.20	0.0	22.0	80.5	Pass



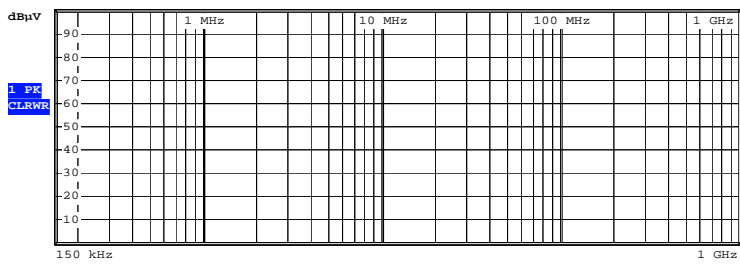
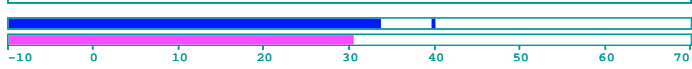
Date: 24.DEC.2009 08:02:32



Att 10 dB

RBW 9 kHz  
MT 10 ms  
PREAMP OFF

**FREQUENCY 13.4915100 MHz**  
PK+ 33.35 dBμV (39.9 13.4915100 MHz)  
QPK 30.17 dBμV (30.4 13.4915100 MHz)



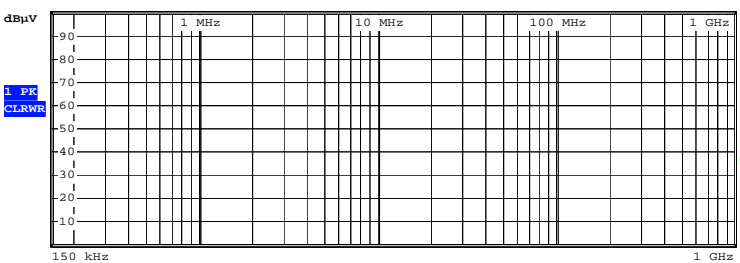
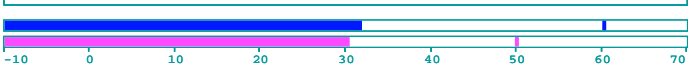
Date: 24.DEC.2009 08:03:19



Att 10 dB

RBW 9 kHz  
MT 10 ms  
PREAMP OFF

**FREQUENCY 13.5598800 MHz**  
PK+ 33.37 dBμV (60.4 13.5598800 MHz)  
QPK 30.25 dBμV (50.2 13.5598800 MHz)

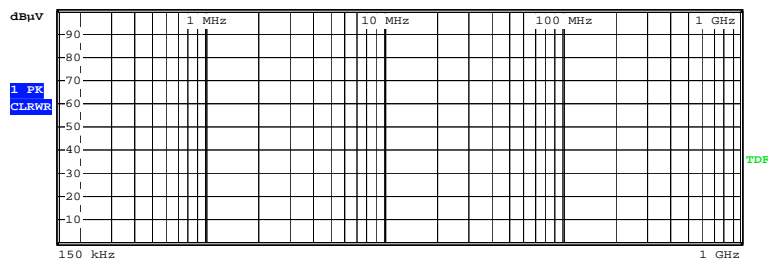
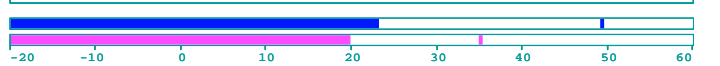


Date: 24.DEC.2009 07:59:28



Att 0 dB RBW 9 kHz  
MT 10 ms  
PREAMP OFF

**FREQUENCY 13.567000 MHz**  
PK+ 25.69 dBμV (49.4 13.567000 MHz)  
QPK 19.75 dBμV (35.2 13.567000 MHz)

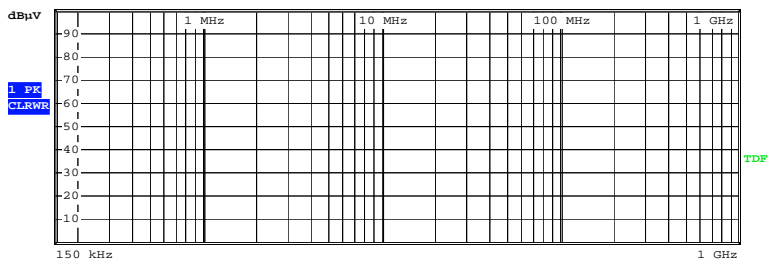
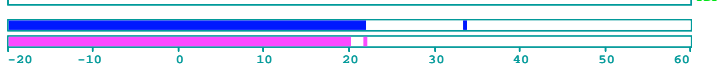


Date: 24.DEC.2009 08:05:10



Att 0 dB RBW 9 kHz  
MT 10 ms  
PREAMP OFF

**FREQUENCY 13.777860 MHz**  
PK+ 24.04 dBμV (33.5 13.777860 MHz)  
QPK 20.05 dBμV (22.0 13.777860 MHz)



Date: 24.DEC.2009 08:06:25

## FCC §15.225(d) §15.209 & §15.31(f) - OUT OF BAND EMISSION

### Applicable Standard

As per FCC Part 15.225(d) §15.31(f) 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.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2009-08-02	2010-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
ETS	Passive Loop Antenna	6512	00029604	2009-03-04	2010-03-04

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### EUT Setup

The out of band emission tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### Test Data

#### Environmental Conditions

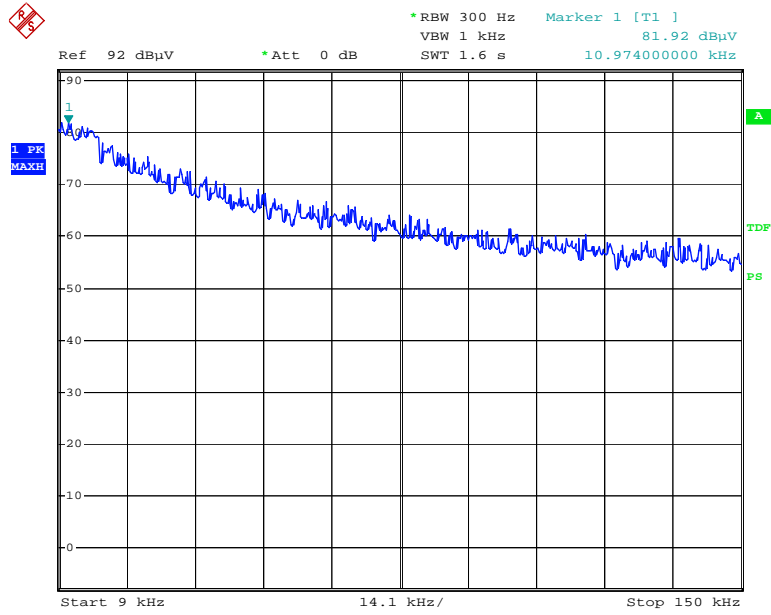
<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

The testing was performed by Phoenix Liu on 2009-12-24.

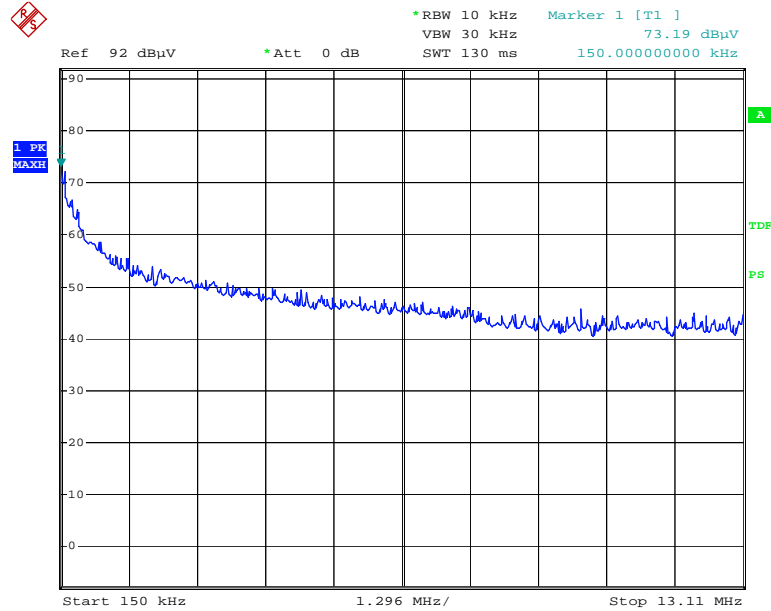
Test Mode: Reading Card

Frequency (MHz)	Table Angle Degree	Antenna Height (m)	Detector (PK/QP/AV)	Cord. Amp. (dB $\mu$ V/m) @3m	FCC Part 15.225/209	
					Limit (dB $\mu$ V/m) @3m	Result
0.011	0	1.2	PK	81.92	126.11	Pass
0.150	0	1.1	PK	73.19	104.00	Pass
16.212	0	1.0	PK	45.31	69.50	Pass
20.480	0	1.2	PK	44.87	69.50	Pass

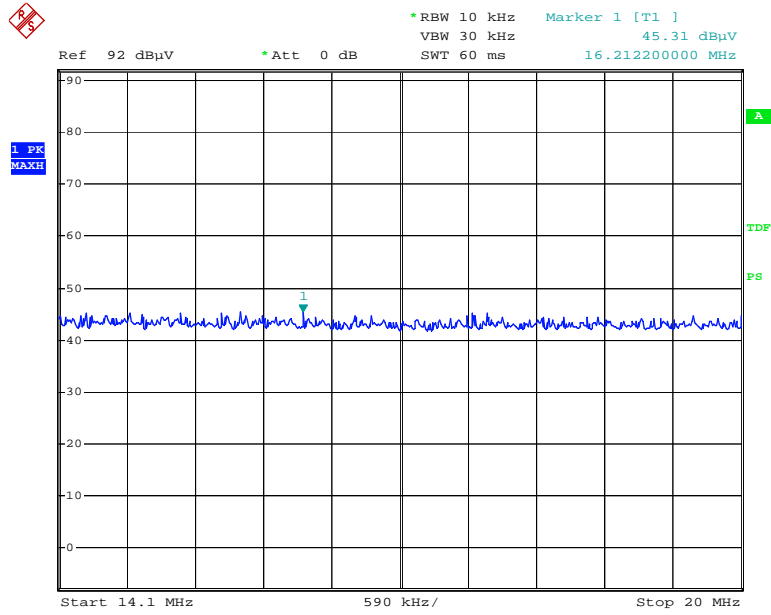
Test Result: Pass



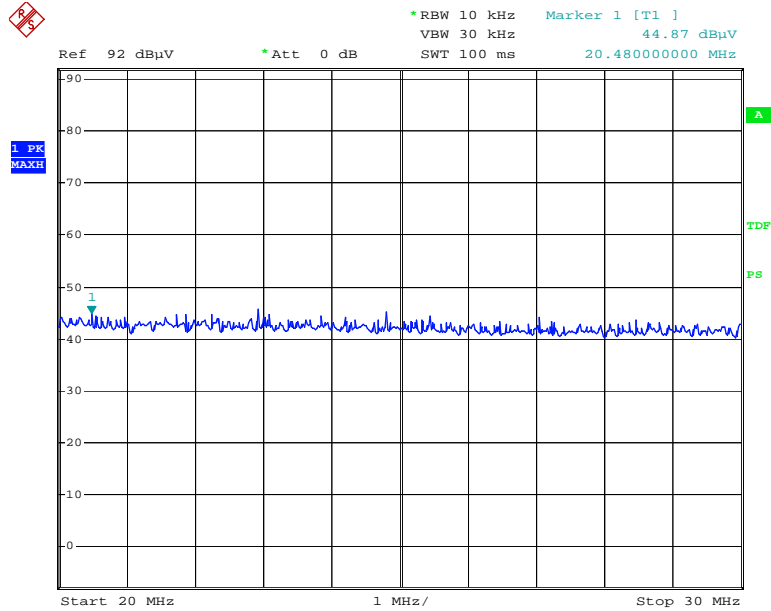
Date: 24.DEC.2009 08:08:49



Date: 24.DEC.2009 08:09:23



Date: 24.DEC.2009 08:07:13



Date: 24.DEC.2009 08:07:43



## FCC §15.225(e) - FREQUENCY STABILITY

### Applicable Standard

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  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. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2009-05-09	2010-05-09
ETS	Passive Loop Antenna	6512	00029604	2009-03-04	2010-03-04

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to PC, than to an external AC power supply and loop antenna was connected to a f Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable AC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

### Test Data

#### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

*The testing was performed by Phoenix Liu on 2009-12-30.*

Test Result: Pass

*Test Mode: Reading Card*

Test Environment		Frequency Reading (MHz)	Frequency Error	Part 15.225 Limit	Result
Power Supply to Host PC	Temperature (°C)				
AC 120 V	-20	13.55990	-0.00074%	±0.01%	Pass
	-10	13.55976	-0.00177%	±0.01%	Pass
	0	13.55980	-0.00147%	±0.01%	Pass
	10	13.55986	-0.00103%	±0.01%	Pass
	20	13.55988	-0.00089%	±0.01%	Pass
	30	13.55989	-0.00081%	±0.01%	Pass
	40	13.55980	-0.00148%	±0.01%	Pass
	50	13.55978	-0.00162%	±0.01%	Pass
Max. = AC 138 V	25	13.55990	-0.00074%	±0.01%	Pass
Min. = AC 102 V	25	13.55970	-0.00221%	±0.01%	Pass

## FCC §15.215(c) – 20 dB BANDWIDTH TESTING

### Requirement

Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-07	2010-11-06
HP	Amplifier	8447E	1937A01046	2009-08-02	2010-08-02
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2009-04-12	2010-04-11
ETS	Passive Loop Antenna	6512	00029604	2009-03-04	2010-03-04

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

### Test Data

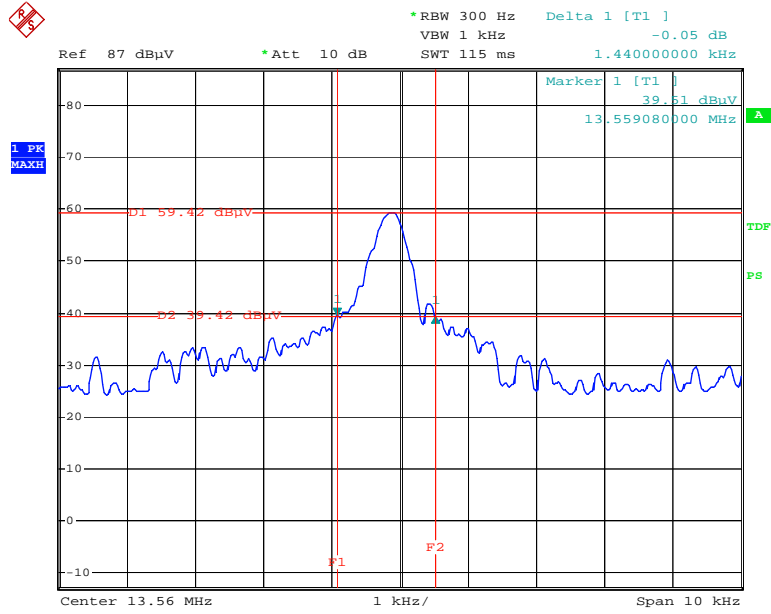
#### Environmental Conditions

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Phoenix Liu on 2009-12-24.*

*Test Mode: Reading Card*

### 20 dB Occupied Bandwidth



Date: 24.DEC.2009 07:57:52

**DECLARATION LETTER****Advanced Card Systems Limited**

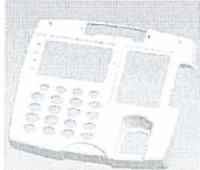

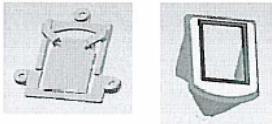
Card and Reader Technologies

**Differences between eH880 Generic and Fingerprint Version****1.0. Introduction**

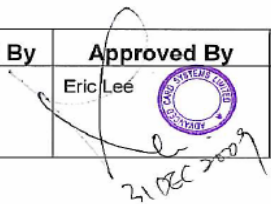
This document describes the hardware differences between eH880 Generic Version (eH880-DP-CL) and eH880 Fingerprint Version (eH880-DP-CF)

**2.0. Description**

The eH880 Generic Version and the eH880 Fingerprint version are nearly identical. Same PCBAs are used for both models. Same firmware can be used on both models. And most of the casing parts are common. The only differences are listed below.

	EH880 Fingerprint Version (eH880-DP-CF)	EH880 Generic Version (eH880-DP-CL)
1.	Front cover for Fingerprint Version 	Front Cover for Generic Version 
2.	Fingerprint module and the flat cable connected to the PCB	(Not installed)
3.	Fingerprint module holder consist of 2 transparent plastic parts and 3 screws 	(Not installed)

**3.0. Revision History**

Version	Date	Prepared By	Approved By	Description
0.1	31/12/2009	CL. Mak	Eric Lee  21 DEC 2009	Document Creation

**\*\*\*\*\* END OF REPORT \*\*\*\*\***