

**FCC PART 15 CLASS B
MEASUREMENT AND TEST REPORT**

For

Advanced Card Systems Ltd.

Units 2010-2013, 20/F, Chevalier Commercial Centre, Kowloon, Hong Kong

FCC ID: V5MACR320

Report Type: Original Report	Product Type: Ticket Validator
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Report Number: RSZ120528002-00	
Report Date: 2012-07-04	
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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*, or any agency of the Federal Government.

* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST FACILITY	3
SYSTEM TEST CONFIGURATION.....	4
DESCRIPTION OF TEST CONFIGURATION	4
EQUIPMENT MODIFICATIONS	4
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	4
EXTERNAL I/O CABLE.....	4
CONFIGURATION OF TEST SETUP	5
BLOCK DIAGRAM OF TEST SETUP	5
SUMMARY OF TEST RESULTS	6
FCC §15.109 - RADIATED EMISSIONS	7
MEASUREMENT UNCERTAINTY	7
EUT SETUP	7
EMI TEST RECEIVER SETUP.....	8
TEST PROCEDURE	8
TEST EQUIPMENT LIST AND DETAILS.....	8
CORRECTED AMPLITUDE & MARGIN CALCULATION	8
TEST RESULTS SUMMARY	9
TEST DATA	9

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Advanced Card Systems Ltd.*'s product, model number: *ACR320* (FCC ID: *V5MACR320*) or the "EUT" in this report was a *Ticket Validator*, which was measured approximately: 28.0 cm (L) x 16.5 cm (W) x 5.0 cm (H), rated input voltage: DC 10 ~36 V from vehicular. The highest frequency generated in the device is 624 MHz.

** All measurement and test data in this report was gathered from production sample serial number: 1205076 (Assigned by BACL, Shenzhen). The EUT was received on 2012-05-28.*

Objective

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

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 Class B.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS, Part 15.225 DXX and Part 22H&24E PCB submissions with FCC ID: V5MACR320

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located on 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion.

Equipment Modifications

No modification was made to the EUT tested.

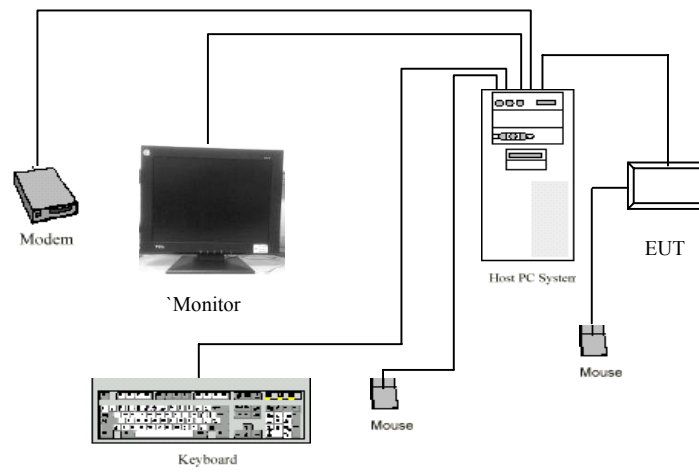
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	PC	VOSTRO 220S	127BP2X
DELL	Keyboard	L100	CNORH656658907BL04TY
DELL	Mouse	MOC5UO	G1B0096D
DELL	LCD Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
ECOM	Modem	5600bps	N/A
DELL	Mouse	-	-

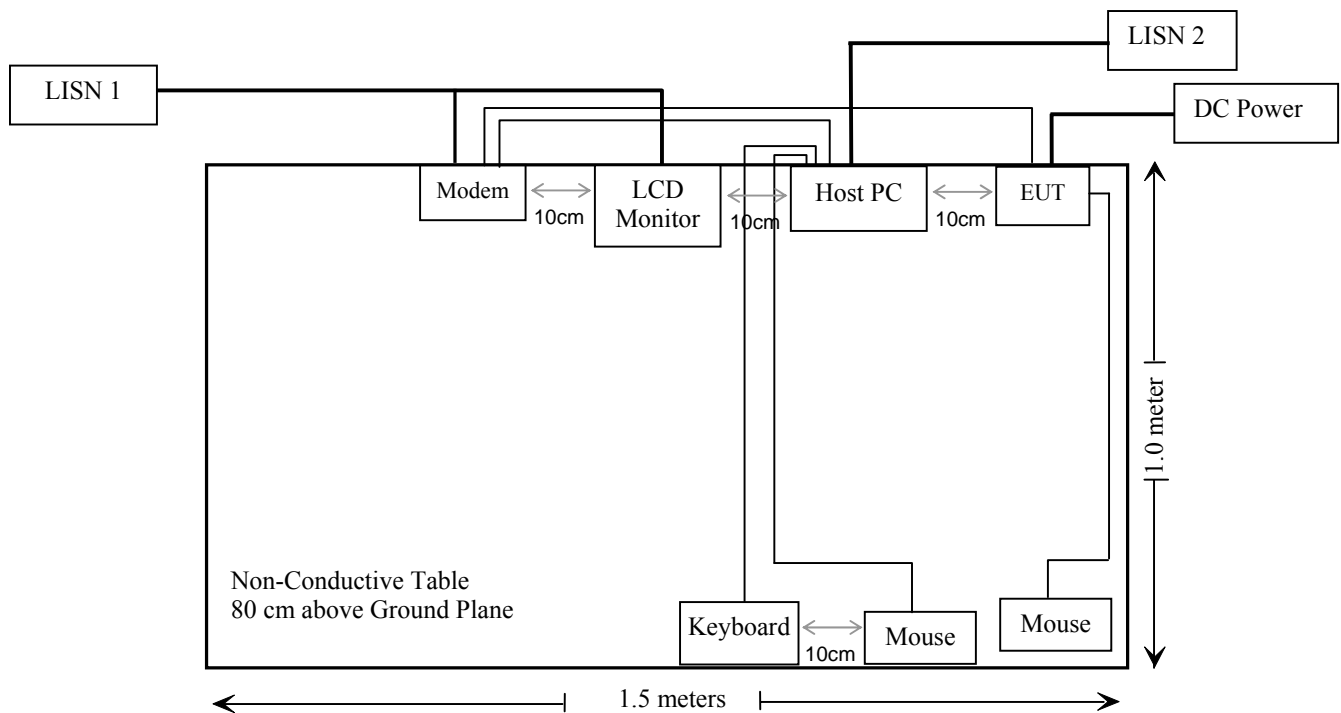
External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielded Detachable K/B Cable	1.5	Keyboard	Host PC
Shielded Detachable Mouse Cable	1.5	Mouse	Host PC
Shielded Detachable Mouse Cable	1.5	Mouse	EUT
Shielded Detachable VGA Cable	1.5	LCD Monitor	Host PC
Unshielded Detachable AC Cable	1.0	LISN 2	Host PC
Shielded Detachable RJ45 Cable	1.8	RJ45 Port of EUT	Modem
Shielded Detachable USB Cable	1.8	Host PC	Modem
Unshielded Detachable AC Cable	1.0	Modem	LISN 1
Unshielded Detachable AC Cable	1.0	LCD Monitor	LISN 1

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	N/A
§15.109	Radiated Emissions	Compliance

Note: EUT is powered by vehicular power only.

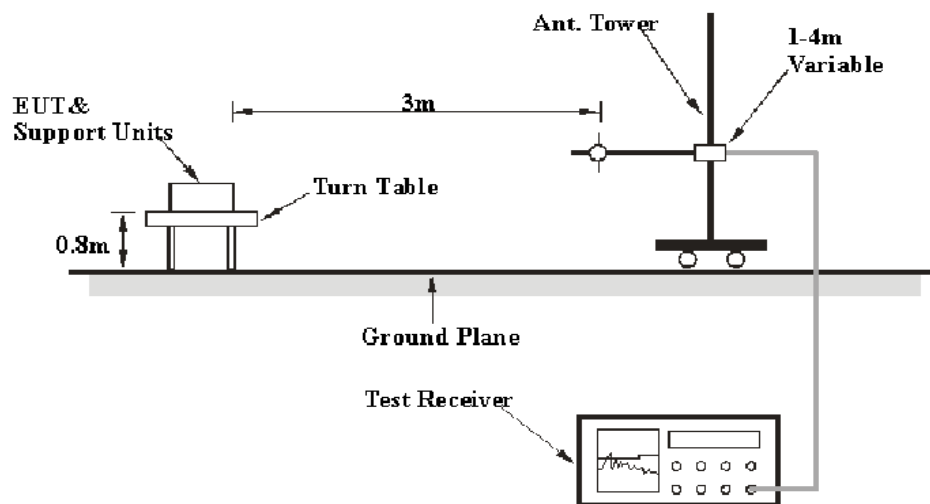
FCC §15.109 - RADIATED EMISSIONS

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 CISPR 16-4-2, 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 4.0 dB. ($k=2$, 95% level of confidence)

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC Part 15.109 Class B limits.

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 host PC was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5000 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>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 5 GHz	1 MHz	3 MHz	PK
1000 MHz – 5 GHz	1 MHz	10 Hz	PK

Test Procedure

During the radiated emissions test, the host PC and all the other relevant equipments were connected to AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01057	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2011-11-17	2012-11-16
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2012-11-27
Mini-Circuits	Amplifier	ZVA-213+	N/A	2011-11-24	2012-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ 26	8386001028	2011-11-24	2012-11-23
R&S	Auto test Software	EMC32	V6.30	N/A	N/A

* **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.

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the worst margin reading is below:

4.9 dB at 311.912500 MHz in the Horizontal polarization

Refer to CISPR16-4-2: 2011 and CISPR 16-4-1: 2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr} \\ \text{or } U_{(Lm)} \leq Margin + U_{cispr}$$

The measurement result of EUT is below the limit level by a margin 4.9 dB and $U_{(Lm)}(4.0 \text{ dB}) \leq Margin(4.9 \text{ dB}) + U_{cispr}(6.3 \text{ dB})$, so the EUT complies with the limit of the FCC §15.109 Class B.

Test Data

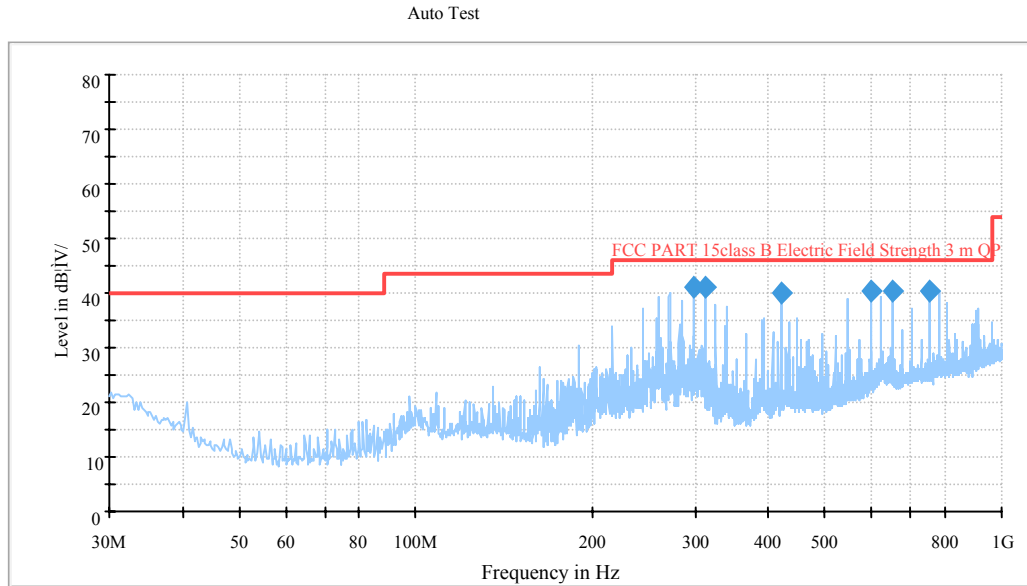
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	48 %
ATM Pressure:	100.0 kPa

The testing was performed by Eric Lee on 2012-06-30.

EUT operation mode: Running (simultaneously working with USB port & RJ 45 port & Reading SAM card & GPS receiver & RSS232 port)

30 MHz-1GHz:



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
311.912500	41.1	104.0	H	25.0	-12.1	46.0	4.9
298.328500	40.9	118.0	H	1.0	-12.4	46.0	5.1
597.976500	40.5	102.0	V	282.0	-6.7	46.0	5.5
650.072500	40.5	103.0	H	234.0	-4.8	46.0	5.5
753.966250	40.4	104.0	H	148.0	-2.4	46.0	5.6
420.425000	39.8	105.0	H	123.0	-9.6	46.0	6.2

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
The corrected factor has been input into the transducer of the test software.
- 3) Margin = Limit – Corrected Amplitude

Above 1 GHz

Frequency (MHz)	Reading (dBμV/m)	Detector (PK/QP/Ave.)	Direction (Degree)	Height (Meter)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss (dB)	Amplifier (dB)	Correction Factor (dBμV/m)	FCC PART 15B	
										Limit (dBμV/m)	Margin (dB)
2931	20.48	Ave.	175	1.1	H	32.30	3.34	26.50	29.62	54.00	24.38
1335	24.18	Ave.	171	1.3	H	24.60	2.09	26.50	24.37	54.00	29.63
2931	32.71	PK	344	1.2	H	32.30	3.34	26.50	41.85	74.00	32.15
1065	22.16	Ave.	242	1.2	H	23.90	1.94	26.50	21.50	54.00	32.50
1335	38.26	PK	180	1.1	H	24.60	2.09	26.50	38.45	74.00	35.55
1065	34.32	PK	125	1.0	H	23.90	1.94	26.50	33.66	74.00	40.34

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
- 3) Margin = Limit – Corrected Amplitude

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