

FCC PART 15.225

TEST REPORT

For

Advanced Card Systems Limited

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

FCC ID: V5MACR1251U-C

Report Type: Class II Permissive Change	Product Type: Smart Card Reader
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Report Number: RSZ160105004-00A1	
Report Date: 2016-01-20	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Advanced Card Systems Limited's* product, model number: *ACR1251U-C (FCC ID: V5MACR1251U-C)* the "EUT" in this report is a *Smart Card Reader*. The EUT was measured approximately: 120 mm (L) x 70 mm (W) x 18 mm (H). Rated input voltage: DC 5V from USB Port.

** All measurement and test data in this report was gathered from production sample serial number: RR271-XXXXXX (Assigned by the applicant). The EUT supplied by the applicant was received on 2016-01-05*

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 the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

This is a CIIPC application of the device, the differences between the original device and the current one are as follows:

1. Changing the PCB of MCU. The chip's model no. is changed to AT90SCR200 from AT90SCR100;
2. Adding material of iron and silver paper at the backcover.

For the change made to the device, the test item "Spurious Radiated Emission" was performed.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories 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 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 October 31, 2013. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10-2013.

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.

SYSTEM TEST CONFIGURATION

Justification

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

EUT Exercise Software

APDU.exe

Equipment Modifications

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

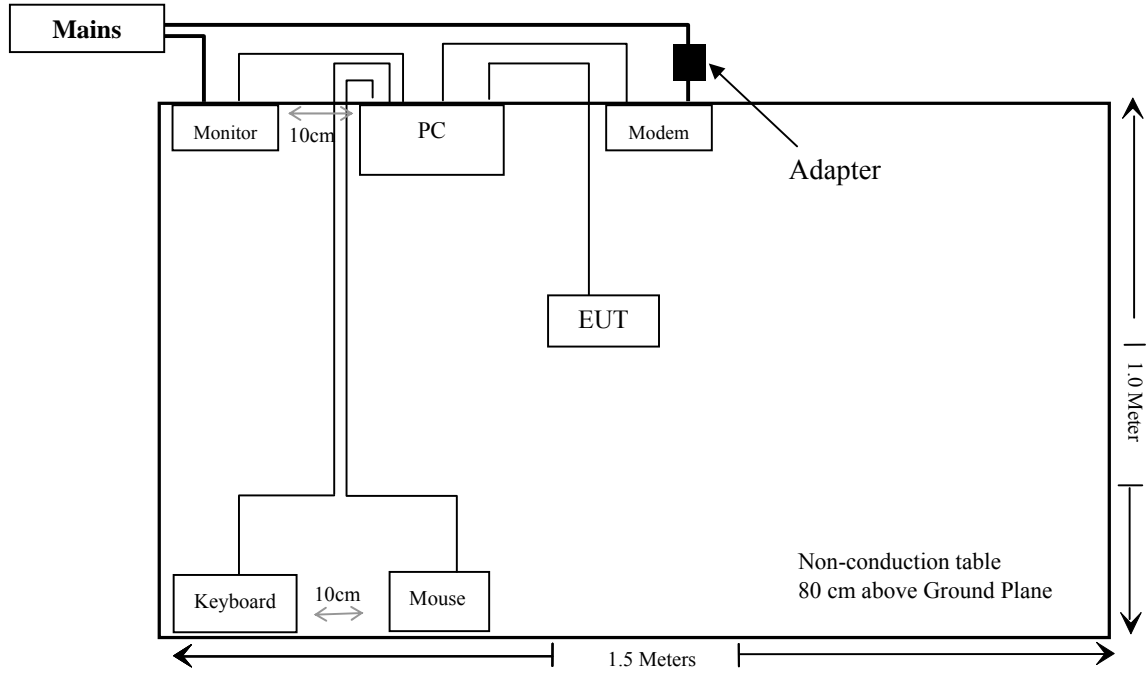
Local Support Equipment

Manufacturer	Description	Model	Serial Number
DELL	PC	DELL 170L	CN-0TC670-70821-560-F4WQ
DELL	LCD Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
DELL	Mouse	MOC5UO	G1B0096D
DELL	Keyboard	L100	CNORH656658907BL04TY
SAST	Modem	AEM-2100	0293
/	Contactless Smart Card	/	/

External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable K/B Cable	1.5	PC	Keyboard
Unshielded Detachable USB Cable	1.5	PC	Mouse
Unshielded Detachable VGA Cable	1.5	PC	LCD Monitor
Shielded Detachable Serial Cable	1.2	PC	Modem
Shielded Detachable USB Cable	1.0	EUT	PC

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance*
§15.207	AC Line Conducted Emission	Compliance*
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance*
§15.215(c)	20dB Emission Bandwidth Testing	Compliance*

Compliance*: Please refer to the original report RSZ130703004-00 that issued on 2013-07-15

FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

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.

(d) 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.

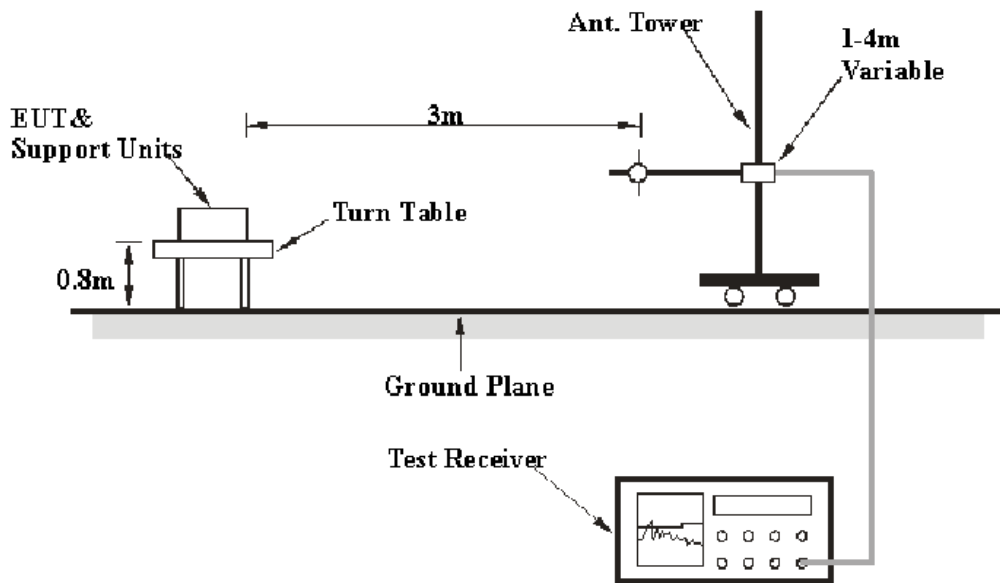
Measurement Uncertainty

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 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report

Frequency	Polarity	Measurement uncertainty
30MHz~200MHz	Horizontal	4.04 dB (k=2, 95% level of confidence)
	Vertical	4.52 dB (k=2, 95% level of confidence)
200MHz~1GHz	Horizontal	4.72 dB (k=2, 95% level of confidence)
	Vertical	5.81 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal / Vertical	4.64 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal / Vertical	4.88 dB (k=2, 95% level of confidence)

EUT Setup



The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

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:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	/	QP
150 kHz –30 MHz	10 kHz	30 kHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	/	QP

Corrected Amplitude & Margin Calculation

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

$$\begin{aligned} \text{Corrected Factor} &= \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} \\ \text{Corrected Amplitude} &= \text{Meter Reading} + \text{Corrected Factor} \end{aligned}$$

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 limit. The equation for margin calculation is as follows:

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2015-11-03	2016-11-03
HP	Amplifier	8447E	1937A01046	2015-05-06	2016-05-06
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-07	2017-12-06
ETS	Passive Loop Antenna	6512	00029604	2014-12-24	2017-12-23

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

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:

4.52 dB at 48.64 MHz in the Vertical polarization

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

$$L_m + U_{(L_m)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(L_m)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	100.0 kPa

The testing was performed by David Lee on 2016-01-16.

Test mode: Transmitting

1) Spurious Emissions (9 kHz~30 MHz):

Indicated		Table Angle Degree	Antenna Height (m)	Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBµV/m) @3m	FCC Part 15.225\15.209	
Frequency (MHz)	Maximum Reading (dBµV) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBµV/m) @3m	Margin (dB)
0.167	5.65	132	1.2	Ave.	59.8	0.2	0	65.65	103.1	37.45
27.12	9.92	347	1.3	QP	30.4	0.2	0	40.52	69.5	28.98

2) Fundamental:

Indicated			Table Angle Degree	Antenna Height (m)	Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBµV/m) @3m	FCC Part 15.225	
Frequency Range (MHz)	Mark point (MHz)	Maximum Reading (dBµV) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)		Limit (dBµV/m) @3m	Margin (dB)
13.110-13.410	13.395	10.58	356	1.0	QP	32.2	0.2	0	42.98	80.5	37.52
13.710-14.010	13.962	11.33	351	1.1	QP	32.2	0.2	0	43.73	80.5	36.77
13.410-13.553	13.553	16.79	348	1.2	QP	32.2	0.2	0	49.19	90.5	41.31
13.567-13.710	13.567	17.45	355	1.2	QP	32.2	0.2	0	49.85	90.5	40.65
13.553-13.567	13.559	28.61	354	1.1	QP	32.2	0.2	0	61.01	124	62.99

3) Spurious Emissions (30 MHz ~1 GHz):

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Detector PK/QP/Ave.	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
48.64	35.48	QP	1.1	V	22	-12.6	40	4.52
67.93	33.36	QP	2.3	H	269	-13.6	40	6.64
142.71	26.71	QP	1.2	V	347	-7.4	43.5	16.79
854.58	37.89	QP	1.2	V	325	2.3	46	8.11

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