



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : E04OR-041

Applicant : S1 Corporation

Address : S1 Bldg., 168, Sunhwa-Dong, Jung-Gu, Seoul Korea 100-130

Manufacturer : S1 Corporation

Address : S1 Bldg., 168, Sunhwa-Dong, Jung-Gu, Seoul Korea 100-130

Type of Equipment : RF Card & Fingerprint Terminal

FCC ID : Q54CDR0193X

Model Name : CDR-0193X

Multiple Model Name : CFN-1000

Serial number : N/A

Total page of Report : 20 pages (including this page)

Date of Incoming : August 10, 2004

Date of Issuing : October 12, 2004

SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART C, SECTION 15.225.**

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

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**1. VERIFICATION OF COMPLIANCE**

- APPLICANT : S1 Corporation
- ADDRESS : S1 Bldg., 168, Sunhwa-Dong, Jung-Gu, Seoul Korea 100-130
- CONTACT PERSON : Mr. Jongil Lee / Senior Manager
- TELEPHONE NO : +82-2-2131-8760
- FCC ID : Q54CDR0193X
- MODEL NO/NAME : CDR-0193X
- SERIAL NUMBER : N/A
- DATE : October 12, 2004

DEVICE TYPE	Intentional Radiator
E.U.T. DESCRIPTION	RF Card & Fingerprint Terminal
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2001
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C, Section 15.225
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

- This device has shown compliance with the conducted emissions limits in 15.107 adopted under FCC 02-107 (ET Docket 98-80). The device may be marketed after July 11, 2005 and is not affected by the 15.37(j) transition provisions.
- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



2. GENERAL INFORMATION

2.1 Product Description

The S1 Corporation, Model CDR-0193X (referred to as the EUT in this report) is a RF Card & Fingerprint Terminal that is attendance and absence system for smart card. This system uses both card input method and /or fingerprint input method for user authentication. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Non-Metal
TX FREQUENCY	13.56 MHz
MODULATION	ASK
ANTENNA GAIN	0dBi
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	Main Board: 3.6864 MHz, RF Module: 13.56 MHz, 22.1184MHz
ANTENNA TYPE	Loop Type and internally installed in the product
RATED SUPPLY VOLTAGE	DC 12V/24V
NUMBER OF LAYERS	Main Board: 6 Layers, RF Module, RF Antenna, LED and Key Board: 2 Layers

2.2 Model Differences:

-. The difference(s) compared to the EUT is as follows:

	Model Name	Model Differences
Basic Model	CDR-0193X	
Multiple Model	CFN-1000	Only type designation for OEM

2.3 Related Submittal(s) / Grant(s)

-. None



2.4 Test System Details

- The EUT was tested with the following all equipment used in the tested systems are:

Model	Manufacturer	FCC ID	Description	Connected to
CDR-0193X	S1 Corporation	Q54CDR0193X	RF Card & Fingerprint Terminal (EUT)	-
N/A	N/A	Q54CDR0193X	RF Card	N/A
3033B	B&J TMI Corp.	N/A	DC Power Supply	EUT

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2001. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Antenna Board	K&J Electronics	KJCRM0070-ANT-V01	N/A
ANT Module Board	S1 Corporation	CRM-0110V1.0	N/A
MAIN Board	S1 Corporation	CDR018X/019X MAIN-V20	N/A
LCD Board	ODT Korea	P128GN18D-C-A	
Function Key Board	N/A	N/A	N/A
LED Board	CDR-0180/0181/0182/0190/0191/0192-LED-V01	N/A	N/A

3.2 EUT exercise Software

- To get a maximum radiated emission from the EUT, the EUT was continuously transmitted RF carrier and the card shall be used with the EUT was tested with together.

The EUT was tested at each voltage input at 12Vdc and 24Vdc, but the worst test data was recorded in this report.

3.3 Equipment Modifications

- Added a line filter (Manufacturer: DIT, Model No: ID-N06AEH) between the power input line of the EUT and the output line of the DC power supply.



3.4 Configuration of Test System

Line Conducted Test: The EUT was powered by DC power supply and the power line of the power supply was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2001 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2001 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The photo was taken at 50kHz/division frequency span, 10kHz resolution bandwidth and 10dB/division logarithmic display from an 8568B spectrum analyzer.

3.5 Antenna Requirement

For intentional device, according to §15.203, 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.

Antenna Construction:

The transmitter antenna of the EUT is an internal antenna in the EUT, so there is no consideration of replacement by the user.



4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Input Voltage	Operation Mode	The Worse operating condition (Please check one only)
12Vdc	Standby Mode	
	TX mode	
24Vdc	Standby Mode	
	TX mode	X

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Input Voltage	Operation Mode	The Worse operating condition (Please check one only)
12Vdc	Standby Mode	
	TX mode	
24Vdc	Standby Mode	
	TX mode	X



5. FINAL RESULT OF MEASUREMENT

5.1 Conducted Emission Test

Humidity Level : 45 %

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15 Section 15.207

Result : PASSED BY -18.54 dB at 0.153 MHz under Quasi-Peak mode.

EUT : CDR-0193X

Date: October 12, 2004

Operating Condition : Continuously Transmitting Mode at 24Vdc.

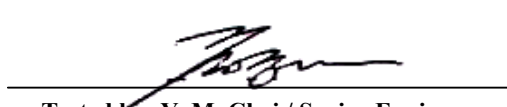
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

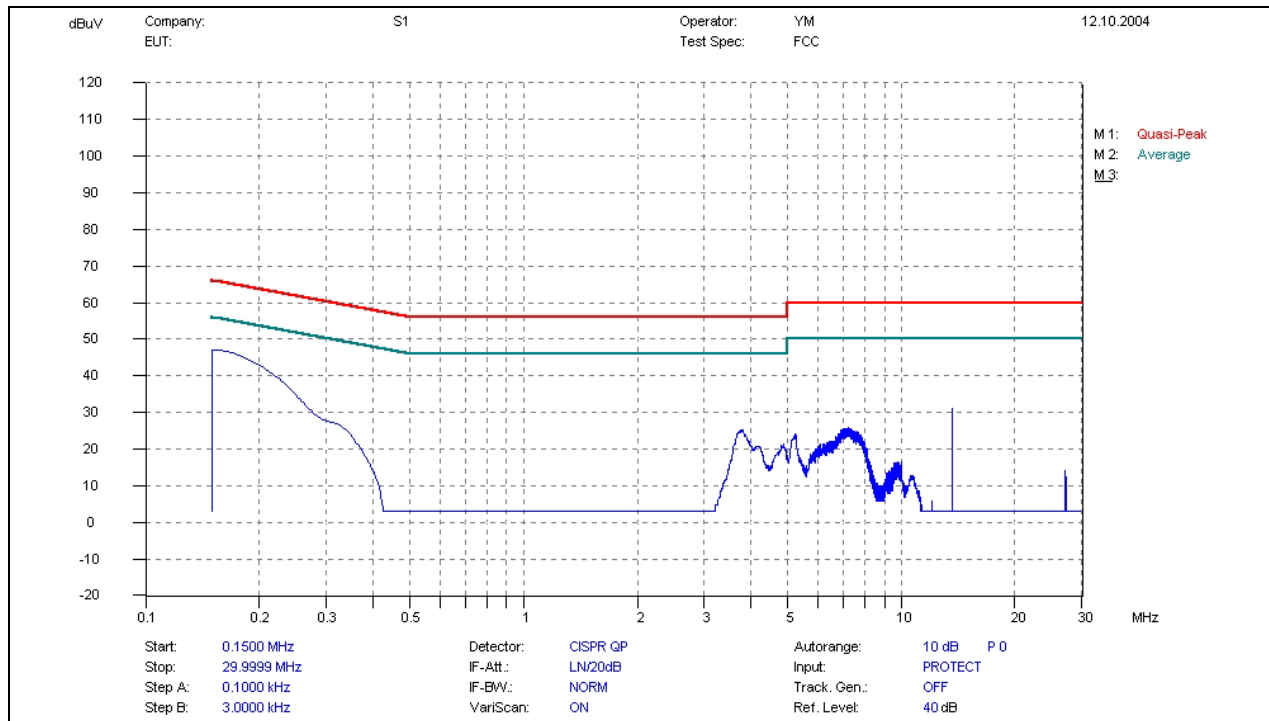
Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.153	N	47.30	Q.P	65.84	-18.54	-	-	-
3.753	H	25.30	Q.P	56.00	-30.70	-	-	-
6.984	N	26.40	Q.P	60.00	-33.60	-	-	-
7.110	N	26.40	Q.P	60.00	-33.60	-	-	-
13.563	N	37.10	Q.P	60.00	-22.90	-	-	-

Line Conducted Emission Tabulated Data

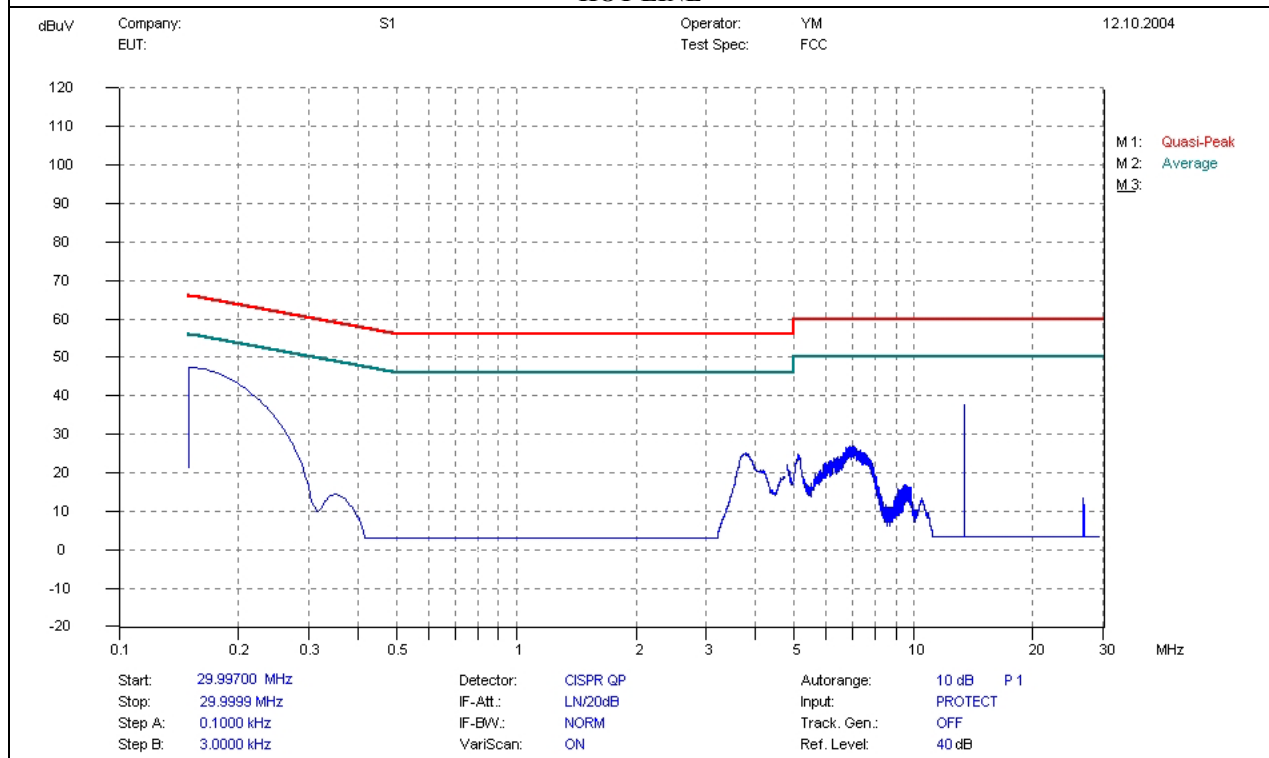
Remark : "H": Hot Line, "N": Neutral line. "Q.P": Quasi-Peak Detector mode

See next page for an overview sweep performed with quasi-peak detector.


Tested by: Y. M. Choi / Senior Engineer



HOT LINE



NEUTRAL LINE

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FCC-004 (Rev.0)

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**5.2 Field Strength of the Carrier Test**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

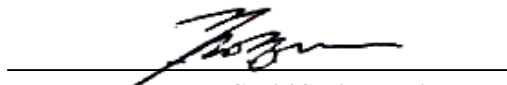
Humidity Level : 55 % Temperature: 28 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(a)
 Type of Test : Transmitter
 Result : PASSED BY -49.50 dB at Peak Mode

EUT : CDR-0193X Date: October 13, 2004
 Operating Condition : TX mode at 24Vdc
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total (dBuV/m)		Limit (dBuV/m)	Margin (dB)	
Carrier Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	Pol.	Ant. (dB/m)	Cable (dB)	Peak	Average		Peak	Average
13.56	63.00	-	H	9.5	0	74.50	-	124.0	-49.50	-
13.56	55.20	-	V	9.5	0	64.70	-	124.0	-59.30	-

Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

A 40dB/decade extrapolation factor was used according to section 15.31.


 Tested by: Y. M. Choi / Senior Engineer

**5.4 Bandwidth of the operating frequency**

Humidity Level : 48% Temperature : 20°C
Limits apply to : Industry Canada RSS-210, Issue 5 Section 5.9.1
Type of Test : INTENTIONAL RADIATOR
Result : PASSED

EUT : WIRELESS DIGITAL MOBILE HEADSET Date: December 02, 2003
Operating Condition : Transmit RF Signal continuously
Minimum Resolution
Bandwidth : 3 or 10 kHz

Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
915.330	322 kHz	-	<u>The point 20dB down from the modulated carrier</u>

Remark: Please see next page for measured test data.

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Gwangju-City, Gyunggi-Do 464-860 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



6. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

6.1 Operating environment

Temperature : 20°C

Relative humidity : 44 %

6.2 Test set-up

Turn EUT off and set chamber temperature to -20°C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10°C step from -20°C to +50°C. Repeat above method for frequency measurements every 10°C step and then record all measured frequencies on each temperature step.

6.3 Test equipment used

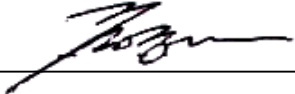
Model Number	Manufacturer	Description	Serial Number
■ - 8564E	HP	Spectrum Analyzer	3650A00756
■ - 53152A	HP	Frequency Counter	US39270295
■ - EY-101	Tabai ESPEC Corp.	Chamber	5104390

All test equipment used is calibrated on a regular basis.

**6.4 Test data**

- Test Date : October 14, 2004
- Result : PASSED BY -63Hz at -20°C

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13560000	13561293	63	±1356
-10		13561293	63	
0		13561253	103	
10		13561233	123	
20		13561220	136	
30		13561147	209	
40		13561133	223	
50		13561087	269	


Tested by: Y. M. Choi / Senior Engineer



7. FREQUENCY STABILITY WITH VOLTAGE VARIATION

7.1 Operating environment

Temperature : 20°C

Relative humidity : 44 %

7.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115% of the nominal value and then was reduced to 85% of nominal voltage. The output frequency was recorded at each step.

7.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number
■ - 8564E	HP	Spectrum Analyzer	3650A00756
■ - 53152A	HP	Frequency Counter	US39270295
■ - 3033B	B&J TMI	DC Power Supply	2056036

All test equipment used is calibrated on a regular basis.



7.4 Test data

- Test Date : October 14, 2004
- Rated Supply Voltage : 12/24 Vdc
- Result : PASSED BY -115 Hz at 115% of 12Vdc

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
13.8 (115%)	13560000	13561241	115	±1356
12.0 (100%)		13561225	131	
10.2 (85%)		13561210	146	
27.6 (115%)	13560000	13561240	116	
24.0 (100%)		13561220	136	
20.4 (85%)		13561213	143	


Tested by: Y. M. Choi / Senior Engineer



8. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

**9. LIST OF TEST EQUIPMENT**

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	DEC/03	12MONTH	■
2.	Test receiver	Schwarzbeck	FCKL 1528	1528-170	JUN/04	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUL/04	12MONTH	
4.	Spectrum analyzer	HP	8568B	3109A05456	JUL/04	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	APR/04	12MONTH	■
6.	Quasi-Peak Adapter	HP	85650A	3107A01542	JUL/04	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	FEB/04	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4443	MAY/04	12MONTH	
		Schwarzbeck	VHA9103	91031852	JAN/04		■
9.	Log Periodic antenna	EMCO	3146	9109-3213	FEB/04	12MONTH	
				9109-3217	MAY/04		
		Schwarzbeck	9108-A(494)	62281001	JAN/04		■
10.	Active Loop Antenna	EMCO	6502	2668	APL/03	36 MONTH	■
11.	LISN	EMCO	3825/2	9109-1867	JUL/04	12MONTH	■
				9109-1869	OCT/03		■
12.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
13.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
14.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■