FCC - TEST REPORT

Report Number	:	**68.950.17.465.01**	Date of Issue:	July 10, 2017
Model	:	**X8**		
Product Type	:	SmartCard Reader		
Applicant	:	SHENZHEN DECARD SMARTCARD TECH CO., LTD.		
Address	:	F4, Bldg 17, Wenguang Industrial Zone, Chaguang Rd, Nanshan District, 518055 Shenzhen, Guangdong, PEOPLE'S REPUBLIC OF CHINA		
Production Facility	:	SHENZHEN DECARD SMARTCARD TECH CO., LTD.		
Address	:	F4, Bldg 17, Wenguang Industrial Zone, Chaguang Rd, Nanshan District, 518055 Shenzhen, Guangdong, PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	19		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	502708
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299

3 Description of the Equipment Under Test

Product:	SmartCard Reader
Model no.:	X8
FCC ID:	2AFSMX8
Brand Name:	NIL
Options and accessories:	NIL
Rating:	5VDC
RF Transmission Frequency:	NFC Frequency: 13.56MHz
Modulation:	RFID
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a SmartCard Reader with RFID function operating at 13.56MHz.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2016 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.209 §15.225(d)	Radiated unwanted emissions	9	1	Pass
§15.225 (a) §15.225 (b) §15.225 (c)	Field strength of fundamental emissions	10	1	Pass
	Field strength outside the allocated band emissions		1	Pass
§15.225(e)	Frequency tolerance	13	1	Pass
§15.215(c)	20dB Bandwidth	14	1	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a PCB antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AFSMX8 complies with Section 15.207, 15.209, 15.215, 15.225 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	June 23, 2017
Testing Start Date:	July 2, 2017
Testing End Date:	July 12, 2017

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

Trevor You

Trevor You
EMC Senior Project Engineer

Reviewed by:

Ricky Yin
EMC Project Engineer

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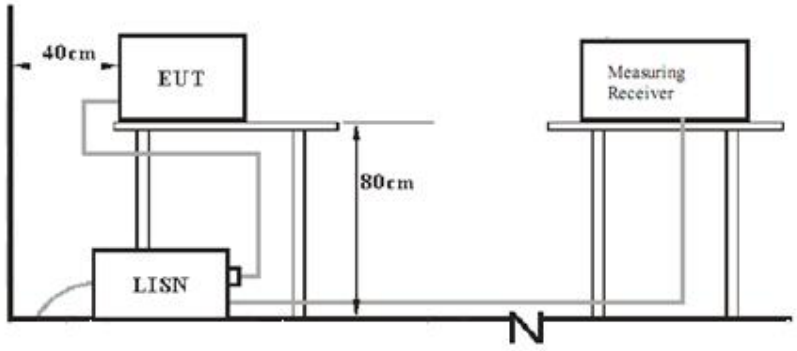
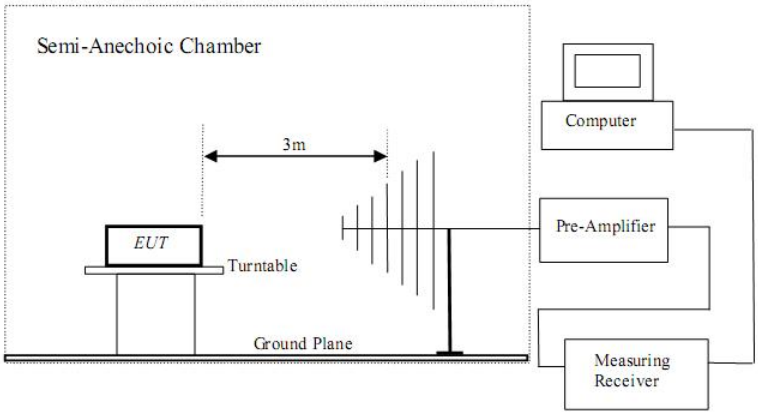
7 Test Setups

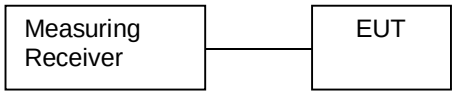
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



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8 Test Methodology

8.1 Conducted Disturbance 0.15 MHz to 30MHz

Test Procedure

The mains cable of the EUT being measured shall be connected to LISN, The LISN shall be placed 0.8m away from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m away from the LISN.
All telecommunication and signal ports must be correctly terminated using either appropriate associated equipment or a representative termination during the measurement of the conducted disturbances at the mains. Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1m.
The setup of Conducted Disturbance for telecommunication port was according to Annex C of EN 55032/CISPR 32.
Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;
The EUT was setup in the shielded chamber and operated under nominal conditions

The measuring bandwidth is:

Frequency of Emission(MHz)	RBW/VBW
0.15-30	10/30KHz

Limit:

Frequency Range(MHz)	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP(dBµV)	AV(dBµV)
0.15MHz~0.5MHz	66-56	56-46
0.5MHz-5MHz	56	46
5MHz~30MHz	60	50

Measuring Result:

Investigate frequency range	Frequency	Emission Level	Line	Limit	Detector	Result
MHz	**MHz**	**dBuV/m**	**(L/N)**	**dBµV/m**		
0.15-30	0.1540	51.53	Line	65.78	QP	Pass
0.15-30	0.1815	49.72	Neutral	64.58	QP	Pass

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8.2 Radiated Unwanted Emission

Test Method

The sample was placed 0.8m above the ground plane on a standard emission test site *. 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 for frequency above 30MHz. And for frequency below 30MHz, a loop antenna is used to measure the field strength. The emissions worst-case are shown in Test Results of the following pages.

*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules.

The measuring bandwidth is:

Frequency of Emission(MHz)	RBW/VBW
0.009-0.15	100/300Hz
0.15-30	10/30KHz
30-1000	100/300KHz

Limit:

Frequency Range(MHz)	Field Strength (Microvolts/meter)	Field Strength(dBμV/m) @3m
0.009-0.49	2400/F(KHz) @300m	129-94
0.49-1.705	24000/F(KHz) @30m	74-63
1.705-30	30 @30m	70
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: Extrapolation(dB)=40*log10(Measuring Distance/Specified Distance) below 30MHz Extrapolation(dB)=20*log10(Measuring Distance/Specified Distance) above 30MHz		

Measuring Result:

Investigate frequency range	Frequency	Emission Level	Polarization	Limit	Detector	Result
MHz	MHz	dBuV/m	(H/V)	dBμV/m		
0.009-30	--	--	--	--	--	--
0.009-30	--	--	--	--	--	--
30-1000	40.67	35.30	Horizontal	40	QP	Pass
30-1000	40.67	38.40	Vertical	40	QP	Pass

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8.3 Field strength of fundamental emissions & outside the allocated band emissions

Test Method

The sample was placed 0.8m above the ground plane on a standard emission test site *. 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, a loop antenna is used to measure the field strength. The emissions worst-case are shown in test results of the following pages.

The measuring bandwidth is:

Frequency of Emission(MHz)	RBW/VBW
13.11-14.01	10/30KHz

Limit:

Frequency Range(MHz)	Field Strength(Microvolts/meter)	Field Strength(dBμV/m) @3m
13.56±0.007	+15,848	124
13.410 to 13.553 13.567 to 13.710	+334	90
13.110 to 13.410 13.710 to 14.010	+106	81
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: Extrapolation(dB)=40*log10(Measuring Distance/Specified Distance) below 30MHz		

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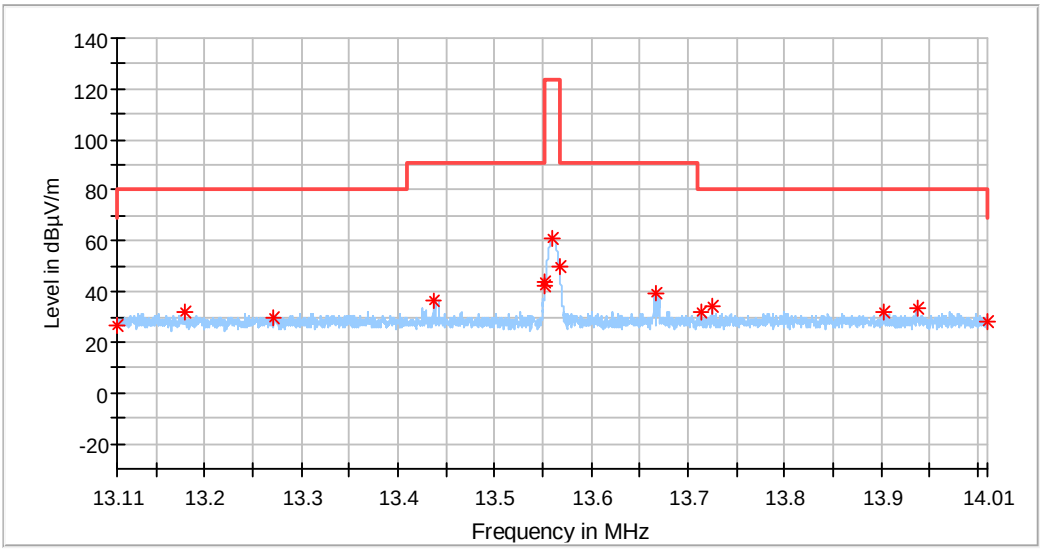
Measuring Result:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB)
13.110000	26.56	69.50	42.94	H	283.0	19.7
13.180500	32.00	80.50	48.50	H	322.0	19.7
13.271550	29.42	80.50	51.08	H	27.0	19.7
13.437600	36.36	90.50	54.14	H	245.0	19.8
13.552500	42.06	90.50	48.44	H	4.0	19.8
13.552950	44.16	90.50	46.34	H	0.0	19.8
13.559700	61.10	123.90	62.80	H	4.0	19.8
13.567050	49.77	90.50	40.73	H	4.0	19.8
13.667400	39.53	90.50	50.97	H	217.0	19.9
13.713300	32.26	80.50	48.24	H	217.0	19.9
13.725450	33.88	80.50	46.62	H	66.0	19.9
13.903650	31.75	80.50	48.75	H	151.0	19.9
13.936950	33.73	80.50	46.77	H	19.0	20.0
14.010000	28.35	69.50	41.15	H	339.0	20.0

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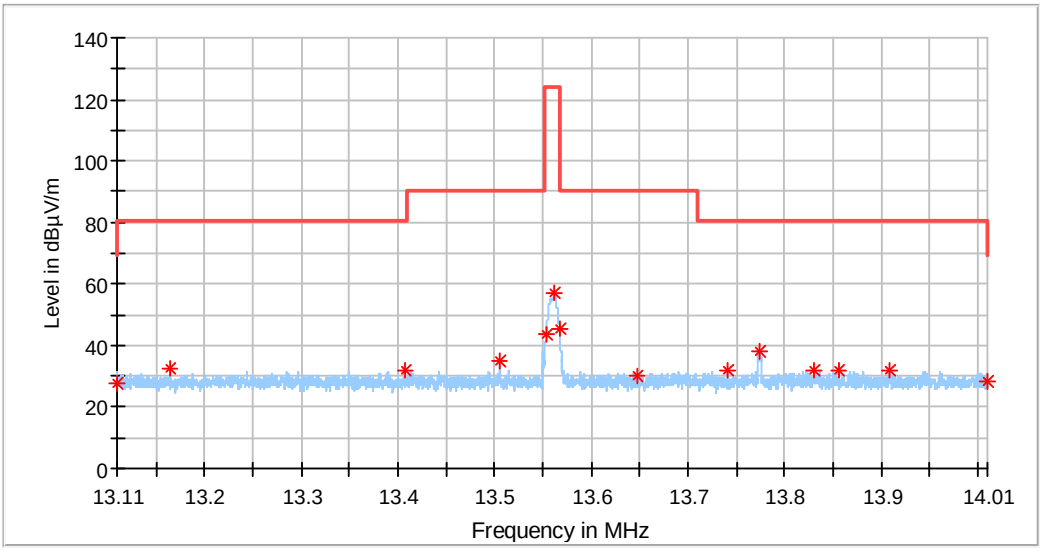

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB)
13.110000	27.85	69.50	41.65	V	136.0	19.7
13.165050	32.57	80.50	47.93	V	136.0	19.7
13.407150	31.88	80.50	48.62	V	9.0	19.8
13.505700	35.00	90.50	55.50	V	0.0	19.8
13.553850	43.78	123.90	80.12	V	0.0	19.8
13.561950	56.99	123.90	66.91	V	0.0	19.8
13.567050	45.56	90.50	44.94	V	0.0	19.8
13.647900	30.13	90.50	60.37	V	289.0	19.9
13.741350	32.20	80.50	48.30	V	289.0	19.9
13.774350	38.11	80.50	42.39	V	5.0	19.9
13.830150	31.89	80.50	48.61	V	98.0	19.9
13.856700	31.79	80.50	48.71	V	213.0	19.9
13.909200	31.76	80.50	48.74	V	298.0	19.9
14.010000	28.38	69.50	41.12	V	39.0	20.0

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8.4 Frequency tolerance

Test Method

The transmitter output signal was picked up by receiver antenna connected to the test receiver, while the receiver antenna was placed within a thermostat to keep in temperature range from -20 to 50 Celsius degrees.

Limit:

The frequency tolerance of the carrier signal shall be maintained within ±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 result:

Test conditions	Carrier frequency	Carrier frequency tolerance
NVLT	13.54842	-0.0854%
NVHT	13.57317	+0.0971%
NTLV	13.54857	-0.0843%
NTHV	13.57320	+0.0973%

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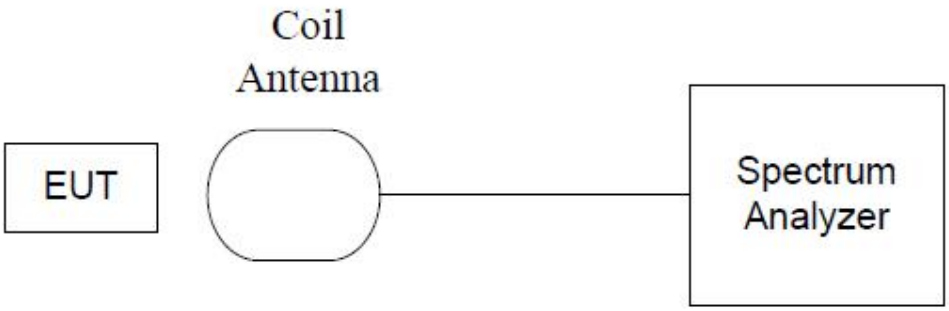
8.5 20dB Bandwidth

Test method:

The Transmitter output signal was picked up by coil antenna to the spectrum analyzer.



Limit:

The 20dB bandwidth shall be less than 80% of the permitted frequency band. For equipment operated at 13.56MHz of clause 15.225, the permitted frequency range is 13.553-13.567MHz, so the limit is 11.2 KHz

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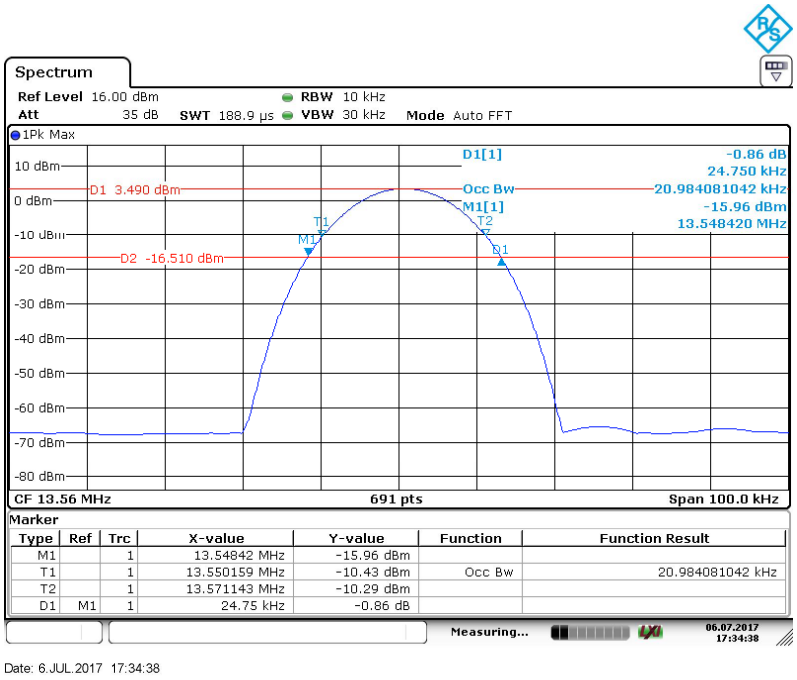
Measuring result:



Date: 6.JUL.2017 17:34:38

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9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
RFID IC card	--	--	--

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10 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	R&S	FSV40	101030	2017-7-23
Trilog Super Broadband Test Antenna	R&S	HF907	102295	2017-7-23
Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	12827	2017-7-23
Pre-amplifier	R&S	SCU 18	102230	2017-7-23
Pre-amplifier	R&S	SCU 40A	100432	2017-7-23
Fully Anechoic Chamber	TDK	8X4X4	--	2019-5-29
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2017-7-23
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2017-7-23
3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Condutcted emission	3.46dB(150KHz-30MHz)
Radiated spurious emission	4.54dB(9KHz-30MHz) Horizontal: U=±4.99dB (30MHz~1GHz) Vertical: U=±4.97dB (30MHz~1GHz) Horizontal: U=±4.89dB (1GHz~18GHz) Vertical: U=±4.88dB (1GHz~18GHz)
Bandwidth	$1.1*10^{-7}$

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