

## FCC - TEST REPORT

Report Number	: <b>68.950.15.188.01</b>	Date of Issue: <u>Sep 01, 2015</u>
Model	: <u>D8</u>	
Product Type	: <u>SmartCard Reader</u>	
Applicant	: <u>SHENZHEN DECARD SMARTCARD TECH CO.,LTD.</u>	
Address	: <u>F4 Bldg 17 Wenguang Industrial Zone Chaguang Rd Nanshan District, 518055 Shenzhen, China</u>	
Production Facility	: <u>SHENZHEN DECARD SMARTCARD TECH CO.,LTD.</u>	
Address	: <u>F4 Bldg 17 Wenguang Industrial Zone Chaguang Rd Nanshan District, 518055 Shenzhen, China</u>	
Test Result	: <b>■ Positive</b> <input type="checkbox"/> <b>Negative</b>	
Total pages including Appendices	: <u>19</u>	

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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.: D8

FCC ID: 2AFSMD8

Brand Name: D&C

Options and accessories: NIL

Rating: 5VDC

RF Transmission 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.

## 4 Summary of Test Standards

<b>Test Standards</b>	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

## 5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	9	1	Pass
§15.209 §15.225(d)	Radiated unwanted emissions in outside band	12	1	Pass
§15.225(a) §15.225 (b) §15.225 (c)	Field strength of fundamental emissions	13	1	Pass
	Field strength within the allocated band emissions		1	Pass
§15.225(e)	Frequency tolerance	15	1	Pass
§15.215(c)	20dB Bandwidth	16	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.

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: 2AFSMD8 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: Aug 13, 2015

Testing Start Date: Aug 14, 2015

Testing End Date: Sep 01, 2015

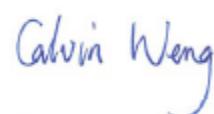
TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:



Phoebe Hu  
EMC Project Manager

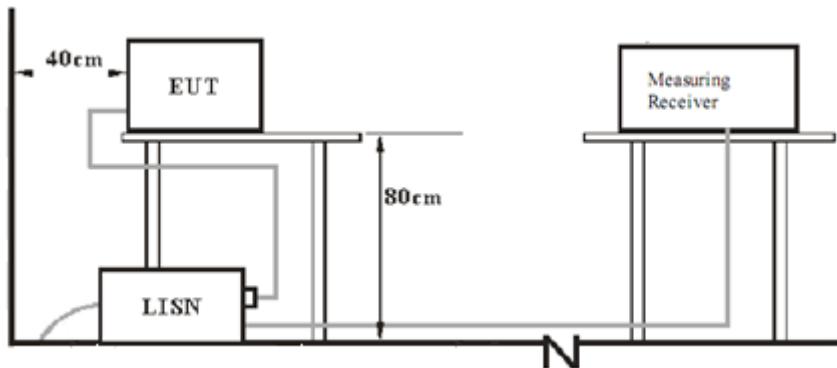
Prepared by:



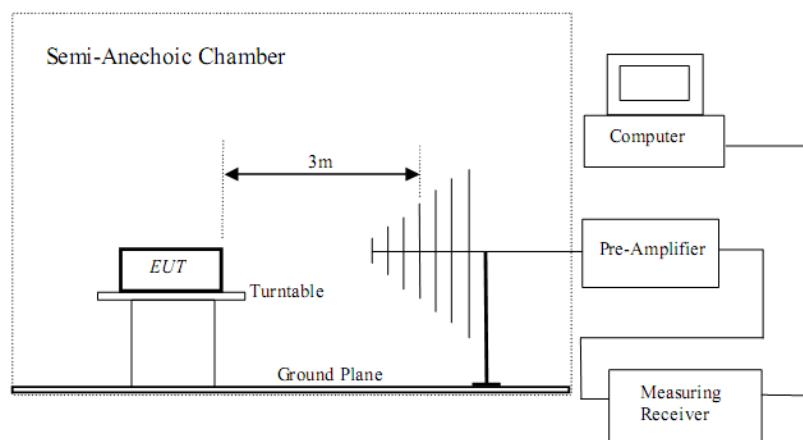
Calvin Weng  
EMC Project Engineer

## 7 Test Setups

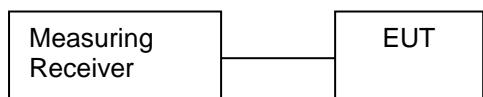
### 7.1 AC Power Line Conducted Emission test setups



### 7.2 Radiated test setups



### 7.3 Conducted RF test setups



## 8 Test Methodology

### 8.1 Conducted Emission on AC power port

#### Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

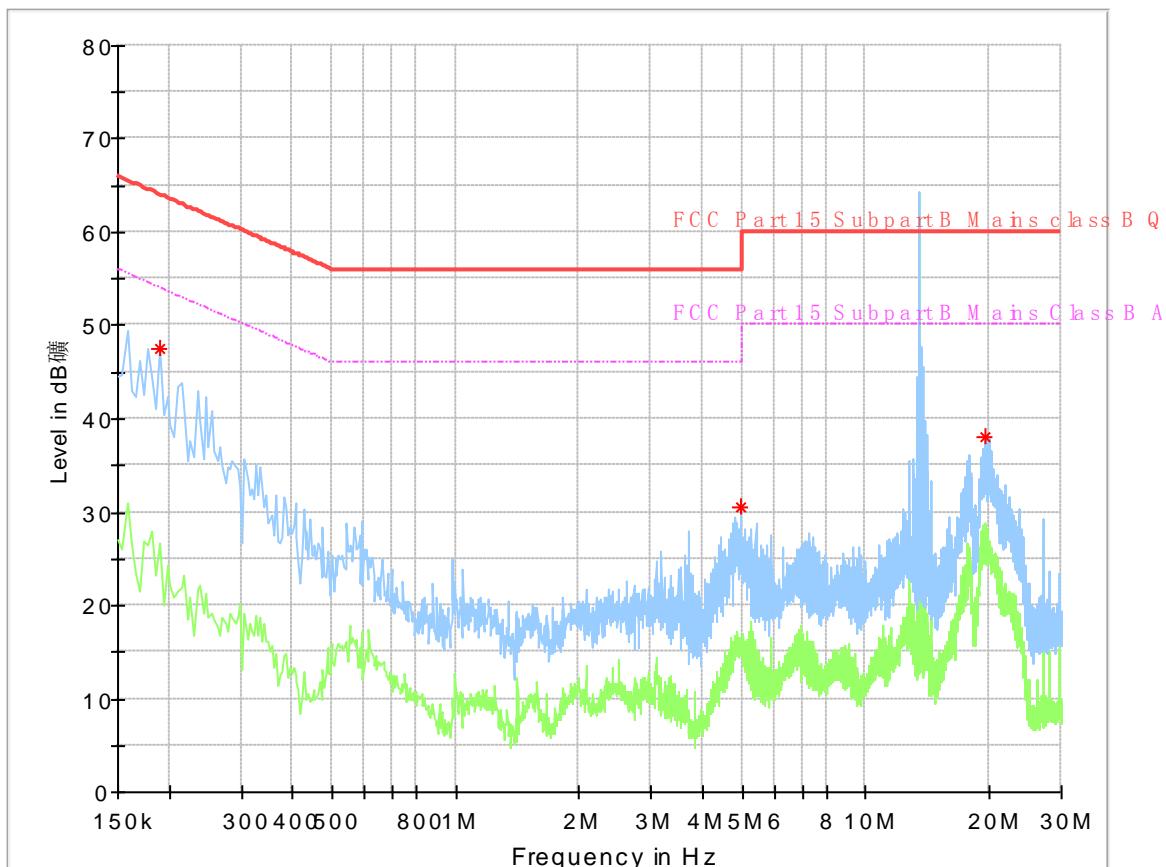
#### Limit

According to §15.207, conducted emissions limit as below:

Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

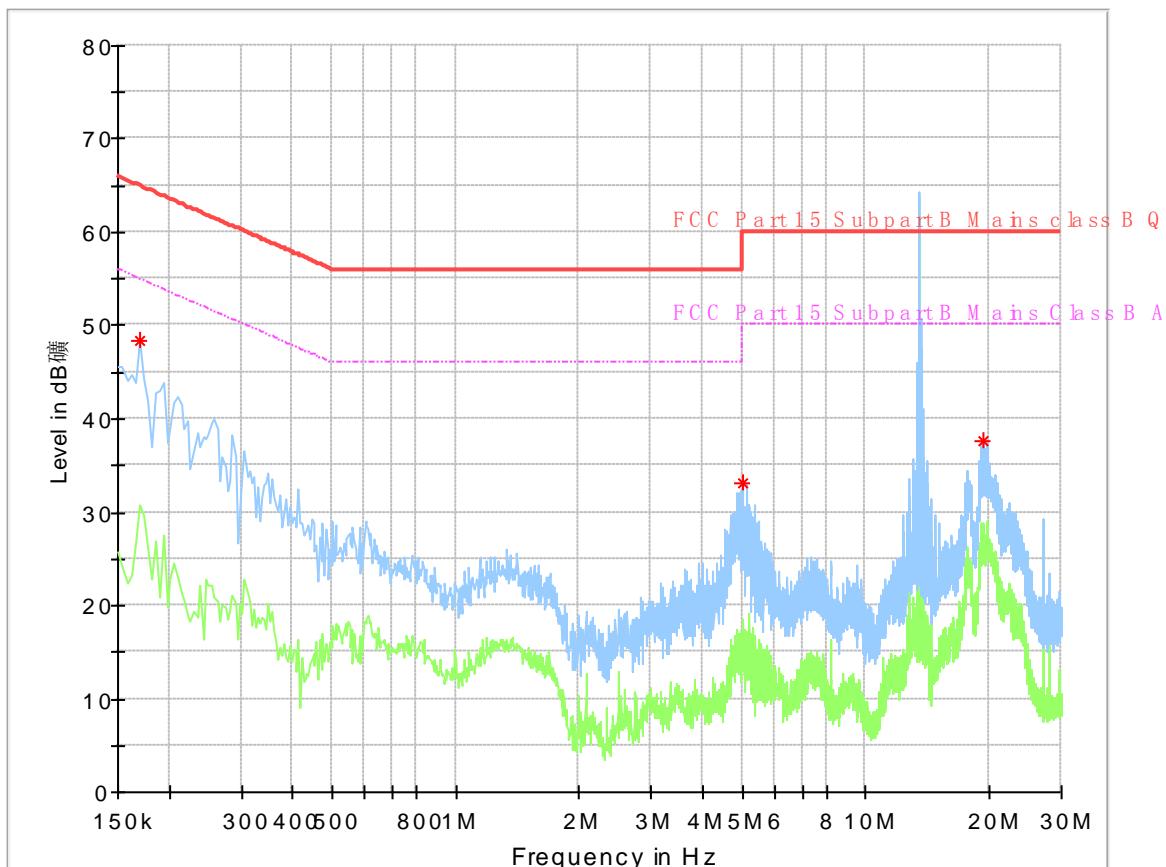
Product Type : SmartCard Reader  
 M/N : D8  
 Operating Condition : Operating  
 Test Specification : Line  
 Comment : AC 120V/60Hz



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Line	Corr. (dB)
0.190000	47.43	64.04	16.61	L1	9.7
4.974000	30.58	56.00	25.42	L1	9.9
19.642000	38.00	60.00	22.00	L1	10.2

Product Type : SmartCard Reader  
 M/N : D8  
 Operating Condition : Operating  
 Test Specification : Neutral  
 Comment : AC 120V/60Hz



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Line	Corr. (dB)
0.170000	48.47	64.96	16.49	N	9.7
5.014000	33.15	60.00	26.85	N	9.8
19.298000	37.73	60.00	22.27	N	10.1

Note: The frequency point exceeding the limit is the fundamental frequency.

## 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(dB $\mu$ V/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)	dBuV/m		
0.009-30	--	--	--	--	--	--
0.009-30	--	--	--	--	--	--
30-1000	40.67	32.78	Horizontal	40	QP	Pass
30-1000	67.77	33.05	Horizontal	40	QP	Pass
30-1000	108.45	29.76	Vertical	43.5	QP	Pass
30-1000	593.81	42.76	Vertical	46	QP	Pass

## 8.3 Field strength of fundamental emissions & within 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

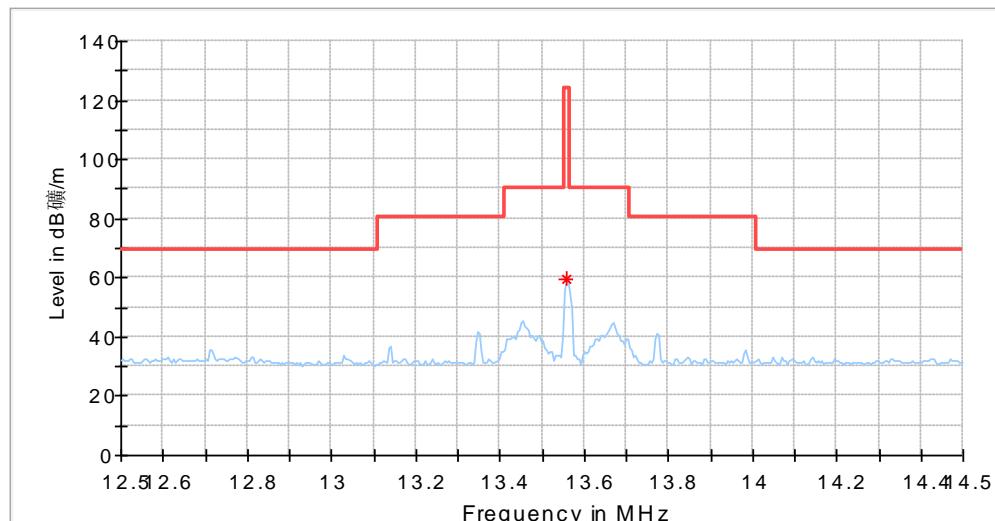
### Limit:

Frequency Range(MHz)	Field Strength(Microvolts/meter)	Field Strength(dB $\mu$ V/m) @3m
13.56±0.007	+15,848	124
13.410 to 13.553	+334	90
13.567 to 13.710		
13.110 to 13.410	+106	81
13.710 to 14.010		

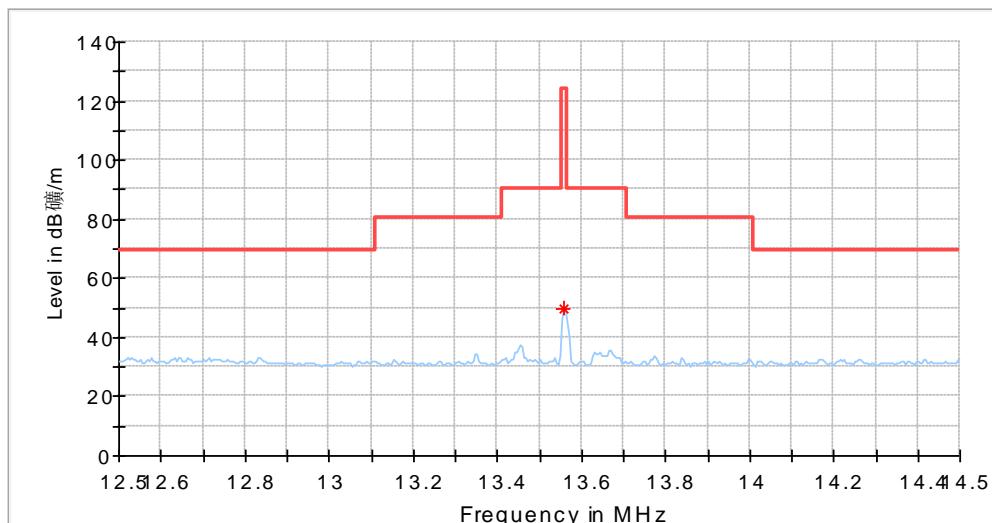
Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:

Extrapolation(dB)=40\*log10(Measuring Distance/Specified Distance) below 30MHz

### Measuring Result:



Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB)
13.559886	59.41	---	---	H	34.0	20.0



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Corr. (dB)
13.559886	49.44	---	---	V	343.0	20.0

## 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  $\pm 0.01\%$  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 result:

#### Frequency Error vs Temperature

Test conditions	Carrier frequency	Carrier frequency tolerance
-20°C	13.561331	+0.0098%
-10°C	13.561324	+0.0098%
0°C	13.561311	+0.0097%
10°C	13.561301	+0.0096%
20°C	13.561307	+0.0096%
30°C	13.561313	+0.0097%
40°C	13.561321	+0.0097%
50°C	13.561315	+0.0097%

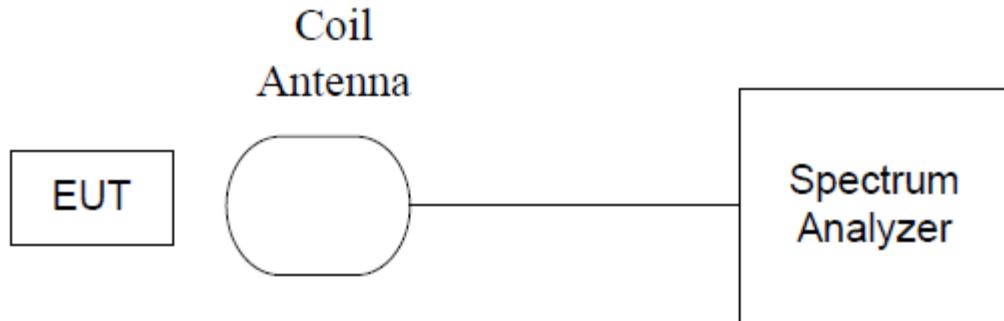
#### Frequency Error vs Voltage

Test conditions	Carrier frequency	Carrier frequency tolerance
4.25VDC	13.561328	+0.0098%
5VDC	13.561329	+0.0098%
5.75VDC	13.561324	+0.0098%

## 8.5 20dB Bandwidth

### Test method:

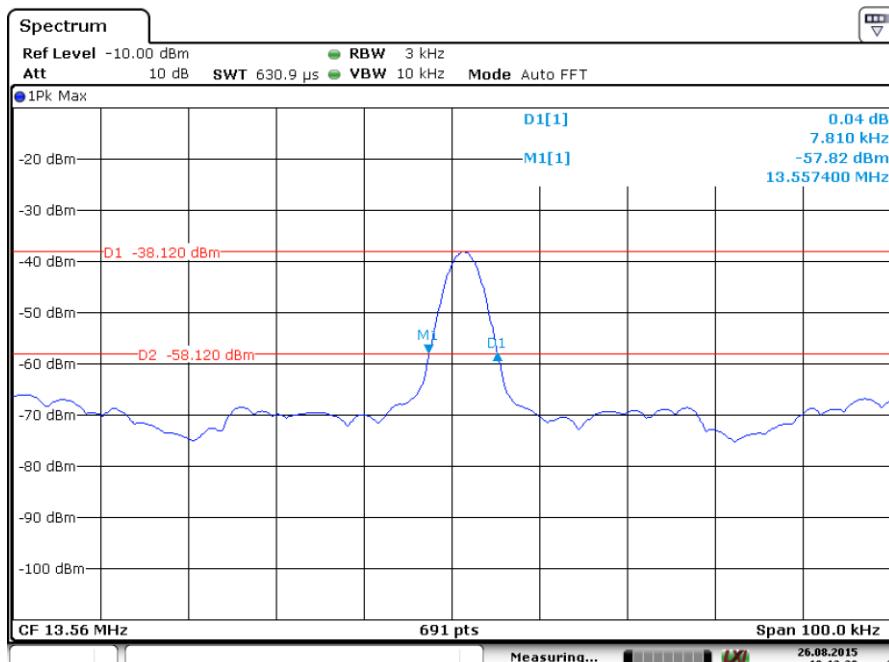
The Transmitter output signal was picked up by coil antenna to the spectrum analyzer.



### 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

### Measuring result:



Date: 26.AUG.2015 18:13:39

## 9 Systems test configuration

Auxiliary Equipment Used during Test:

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

## 10 Test Equipment List

### List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	R&S	FSV40	101030	2016-7-24
Trilog Super Broadband Test Antenna	R&S	HF907	102295	2016-7-31
Horn Antenna	Q-PAR	QWH-SL-18-40- K-SG	12827	2016-7-24
Pre-amplifier	R&S	SCU 18	102230	2016-7-24
Pre-amplifier	R&S	SCU 40A	100432	2016-7-24
Fully Anechoic Chamber	TDK	8X4X4	--	2019-5-29
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2016-7-24
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2016-7-24
3m Semi-anechoic chamber	TDK	9X6X6	----	2019-5-29

## 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
Conducted emission	3.5dB(150KHz-30MHz)
Radiated spurious emission	4.54dB(9KHz-30MHz) Horizontal: $U=\pm 4.83\text{dB}$ (30MHz~1GHz) Vertical: $U=\pm 4.91\text{dB}$ (30MHz~1GHz) Horizontal: $U=\pm 4.89\text{dB}$ (1GHz~18GHz) Vertical: $U=\pm 4.88\text{dB}$ (1GHz~18GHz)
Bandwidth	$1.1 \times 10^{-7}$