SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

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TEST REPORT

Application No.: SHEM111200169001

Applicant: Beijing StrongLink Technology Co., Ltd.

Address: RM 3-105 Building A, No. 170 Beiyuan Road, Chaoyang District, Beijing 100101

Equipment under Test (E.U.T)

Product Name: Mifare Module

Model No.: SL030/SL031/SL032

Serial No.: Not supplied by client

Standards: EN 301 489-3 V 1.4.1(2002-08)

EN 301 489-1 V 1.8.1(2008-04)

Date of Receipt: 2012-1-6

Date of Test: 2012-1-10 to 2012-01-16

Date of Issue: 2012-1-19

Test Result :	**PASS ***

* In the configuration tested, the E.U.T detailed in this report complied with the standards specified above.

* The other tests (e.g. Low Voltage Directive 2006/95/EEC) required in R&TTE Directive 1999/5/EC were not included in the report, only part tests related to EMC were performed and reported in this report. Hence to clarify compliance with R&TTE directive 1999/5/EC shall comply with the other essential required tests additionally.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

Tony Wu
E&E Section Manager
SGS-CSTC(shanghai) Co., Ltd.

Neil Zhang
E&E Project Engineer
SGS-CSTC(shanghai) Co., Ltd.

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Member of the SGS Group (Société Générale de Surveillance)

2 Test Summary

Electromagnetic Compatibility (EMC) Part					
Test	**Test Requirement**	**Test Method**	**Class / Severity**	**Remark**	**Result**
Radiated Emission, 30MHz to 6GHz	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 8.2	Table 4	Enclosure	PASS
Conducted Emission (150K to 30MHz)	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 8.4	N/A	N/A	N/A
Harmonic Emission on AC, 50Hz to 2kHz	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 8.5	N/A	<75W	N/A
Flicker Emission on AC	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 8.6	N/A	N/A	N/A
ESD (ElectroStatic Discharge)	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.3	Table 3 row 3	Enclosure	PASS
Radiated Immunity, 80MHz to 2.7 GHz	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.2	Table 3 row 2	Enclosure	PASS
EFT (Electrical Fast Transients)	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.4	N/A	N/A	N/A
Surge Immunity	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.8	N/A	N/A	N/A
Injected Currents 150kHz to 80MHz	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.5	N/A	N/A	N/A
Voltage Dips and Interruptions	EN 301 489-3: 2002 V1.4.1	EN 301 489-1:2008 V 1.8.1 clause 9.7	N/A	N/A	N/A

Note 1: The EUT voltage is 3.3V DC, not have AC port.

Note 2: N/A =Not Applicable

Note 3: There are 3 models mentioned in this report,the electrical circuit design,layout,components used and internal wiring for above three modes are identical,only their interface and MCU's memory size are different. So we choiced SL030 for the typical sample to do all the test.

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4 General Information

4.1 Client Information

Applicant:	Beijing StrongLink Technology Co., Ltd.
Address of Applicant:	RM 3-105 Building A, No. 170 Beiyuan Road, Chaoyang District, Beijing 100101
Manufacturer:	Beijing StrongLink Technology Co., Ltd.
Address of Manufacturer:	RM 3-105 Building A, No. 170 Beiyuan Road, Chaoyang District, Beijing 100101

4.2 General Description of E.U.T. (Equipment Under Test)

Product Name:	Mifare Module
Model No.:	SL030/SL031/SL032
Operating Frequency:	13.56MHz
Antenna Type:	Integral

4.3 Details of E.U.T.

Power Supply: 2.5~3.6 VDC

4.4 Description of Support Units

Name	Model No.	Remark
DC POWER SUPPLY	SK1730SL5A	Calibration Date :2011-4-27

4.5 Deviation from Standards

None.

4.6 Monitoring of E.U.T for the Immunity Test

Visual: Monitored the EUT transmit frequency by the test receiver.
Audio: N/A

4.7 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
No.588 West Jindu Road, Songjiang District, Shanghai, China. 201612.
Tel: +86 21 6191 5666 Fax: +86 21 6191 5655

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4.8 Test Confident level

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2012-03-17.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3172 and C-3514 respectively. Date of Registration: 2009-11-30. Date of Expiry: 2012-03-17.

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5 Equipments Used during Test

Radiated Emission

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2011-06-03	2012-06-02
2	Antenna	SCHWARZBECK	VULB9168	9168-313	2011-06-03	2012-06-02
3	CONTROLLER	INNCO	CO200	474	/	/
4	Antenna	SCHWARZBECK	VULB9168	9168-313	2011-06-04	2012-06-03
5	Antenna	SCHWARZBECK	BBHA9120D	9120D-679	2011-06-04	2012-06-03

Radiated Immunity

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2011-10-07	2012-10-06
2	amplifier	AR	30W1000B	0327284	--	--
3	amplifier	AR	30S1G3	0324978	--	--
4	power meter	Rohde & Schwarz	NRP	101641	2011-05-03	2012-05-03
5	Signal generator	Rohde & Schwarz	SMR40	100555	2011-06-03	2012-06-02

Electrostatic Discharge Test

Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Cal. Due date
1	ESD Simulator	TESEQ	NSG 437	468	2011-08-05	2012-08-04

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6 EMC Requirements Specification in EN 301489-3

Type of SRD Equipment in EN301489-3, subclause 4.1 table 1

Equipment Type	Technical nature of the primary function
I	Transfer of messages (digital or analogue signals)
II	Transfer of audio (speech or music)
III	Others

Classification of SRD Equipment in EN301489-3, subclause 6.1 table 3

Class of SRD Equipment	Risk assessment of Rx performance
1	Highly reliable SRD communication media; e.g. serving human life inherent system (may result in a physical risk to a person).
2	Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply overcome by other means.
3	Standard reliable SRD communication media; e.g. causing inconvenience to persons, which can simply overcome by other means.

Performance classification of Short Range Devices, Table B.1

Class	Application
	Telecommand/Telecontrol
3	Garage door openers
3	Car Lock/Unlock devices
1	Remote control, models - planes
2	Remote control, models - ships, cars, etc.
3	Remote control toys general
3	Radio remote control television, Audio, etc.
2	Remote control appliances and lighting, etc. for residential use only
3	RF door bell
3	Baby monitor
1	Remote control power and lighting
1	Remote surveillance switching
1	Remote control cranes, etc.
1	Remote control grass cutting tractors, etc.
1	Emergency shutdown controls
2	Level indicators

Remark: The E.U.T belong to Type I, class 3.

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7 EMC Requirements Specification

7.1 EMI (Emission)

7.1.1 Radiated Emission

Test Method: EN 301 489-1 clause 8.2.2 , EN55016-2-3

E.U.T Operation:

Application: Enclosure of ancillary equipment.

Status: Test in working mode (operating frequency is 13.56MHz).

Ambient: Temp.: 25 °C, Humid.: 46 % Press.: 1010 mbar

Frequency Range: 30MHz to 6GHz

Antenna Polarity: Horizontal & Vertical

Test Limit

Limits for radiated disturbance at a measurement distance of 3 m

Frequency Range	Limit	
30MHz to 230MHz	40dBuV/m (Quasi-Peak limit)	
230MHz to 1000MHz	47dBuV/m (Quasi-Peak limit)	
1000MHz to 3000MHz	70dBuV/m(Peak limit)	50dBuV/m(Average Limit)
3000MHz to 6000MHz	74dBuV/m(Peak limit)	54dBuV/m(Average Limit)

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Test Configuration:

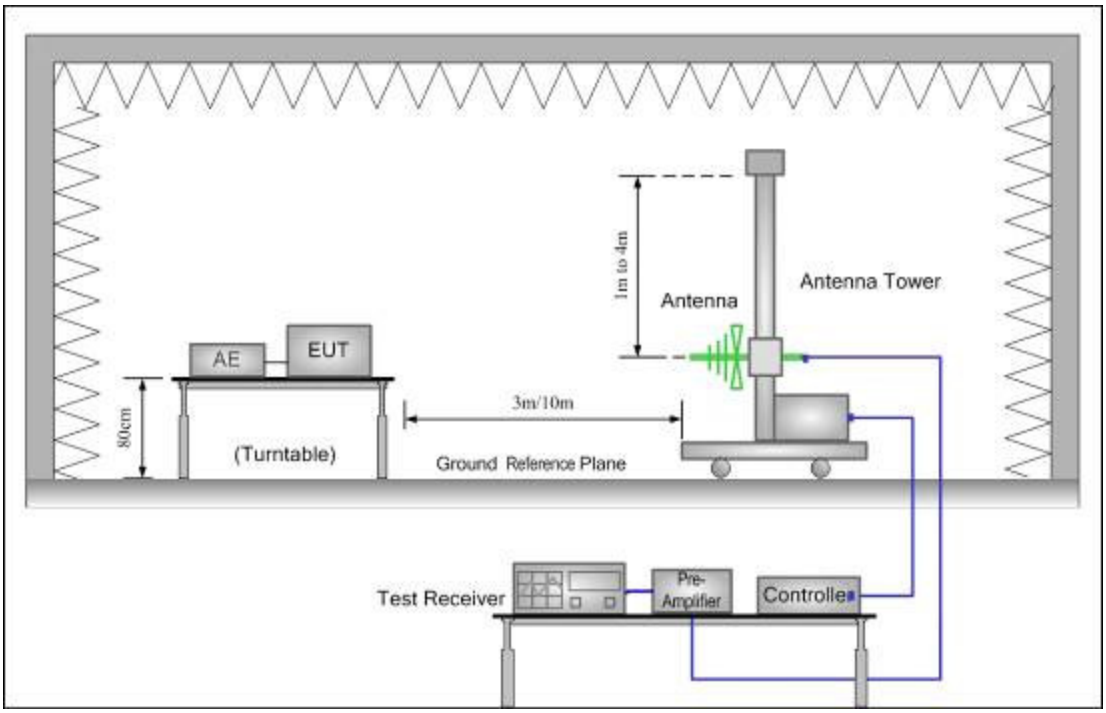

Figure 1.30MHz to 1GHz

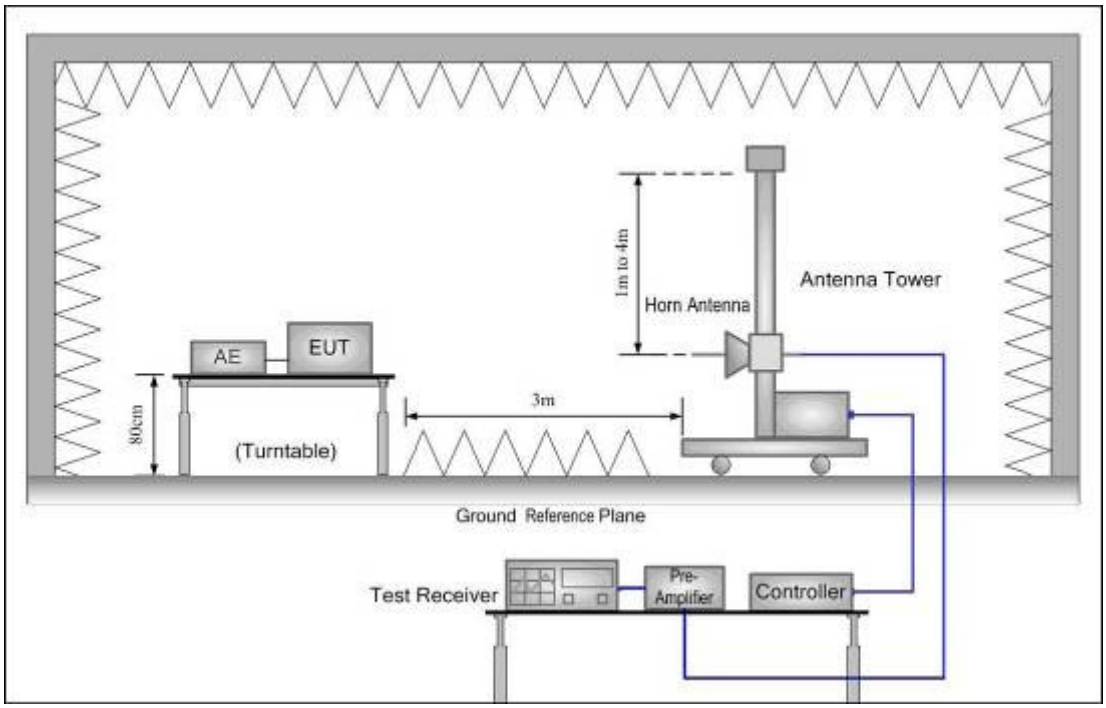

Figure 2. Above 1GHz

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Test procedure:

i) From 30MHz to 1GHz:

1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The tabletop E.U.T was placed upon a non-metallic table 0.1m above the ground reference plane. And for floor-standing arrangement, the E.U.T was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the E.U.T.
4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the E.U.T was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

ii) Above 1GHz:

1. The radiated emissions test was conducted in a fully-anechoic chamber.
2. The tabletop E.U.T was placed upon a non-metallic table 0.1m above the ground reference plane. And for floor-standing arrangement, the E.U.T was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the E.U.T.
4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the E.U.T was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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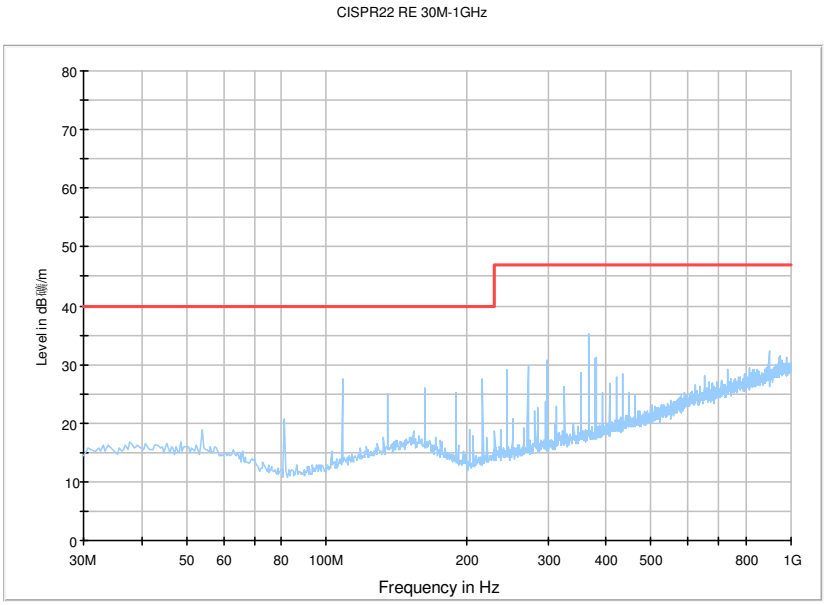
Measurement Record
30MHz to 1GHz emissions

Horizontal



Frequency	Receiver QP Level	Limit	Margin
(MHz)	(dBuV/m)	(dBuV/m)	(dB)
30.00	*	40.00	*
50.00	*	40.00	*
80.00	*	40.00	*
100.00	*	40.00	*
200.00	*	40.00	*
400.00	*	47.00	*
800.00	*	47.00	*
1000.00	*	47.00	*

"*" means the emission level is 6dB lower than the relevant limit.

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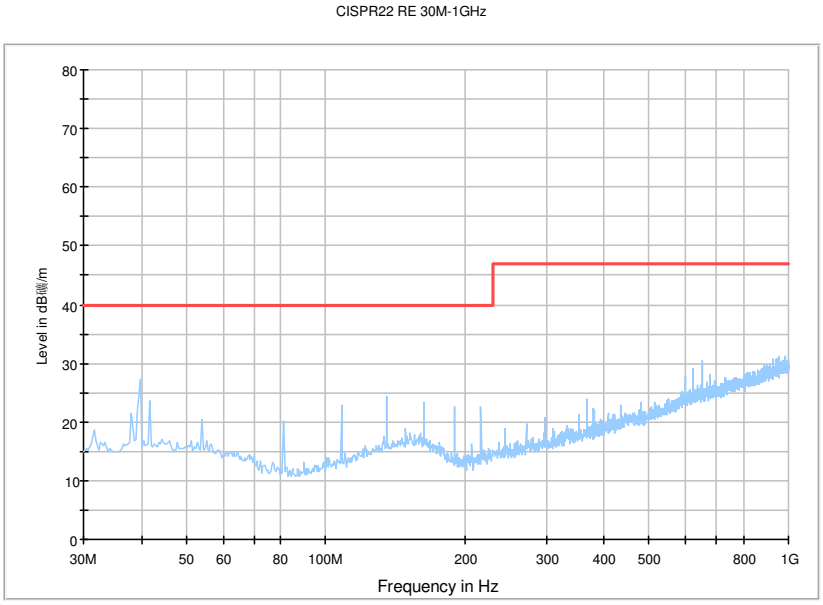
Vertical



Frequency	Receiver QP Level	Limit	Margin
(MHz)	(dBuV/m)	(dBuV/m)	**(dB)**
30.00	*	40.00	*
50.00	*	40.00	*
80.00	*	40.00	*
100.00	*	40.00	*
200.00	*	40.00	*
400.00	*	47.00	*
800.00	*	47.00	*
1000.00	*	47.00	*

"*" means the emission level is 6dB lower than the relevant limit.

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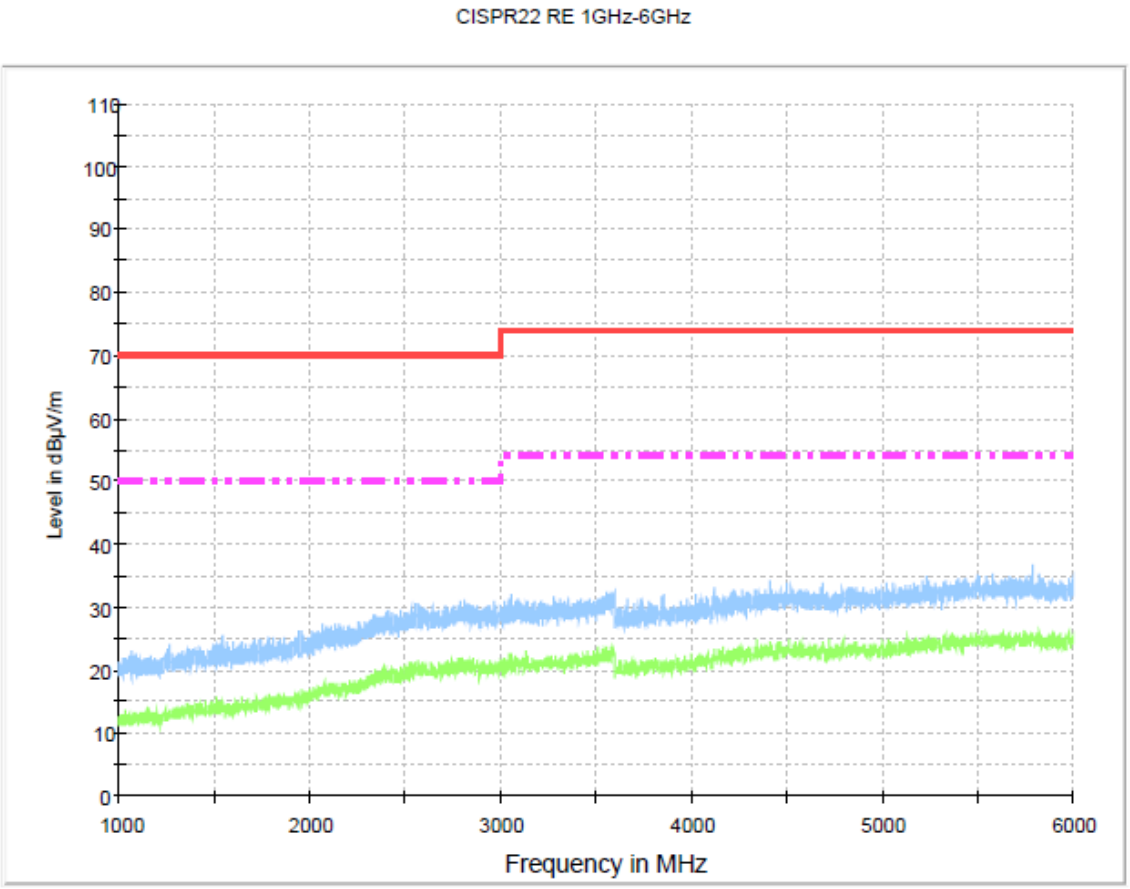
Above 1GHz emissions

Horizontal



Frequency (GHz)	Receiver PK Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Receiver AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1.0	*	70.00	*	*	50.00	*
2.0	*	70.00	*	*	50.00	*
3.0	*	70.00	*	*	50.00	*
4.0	*	74.00	*	*	54.00	*
5.0	*	74.00	*	*	54.00	*
6.0	*	74.00	*	*	54.00	*

"*" means the emission level is 6dB lower than the relevant limit.

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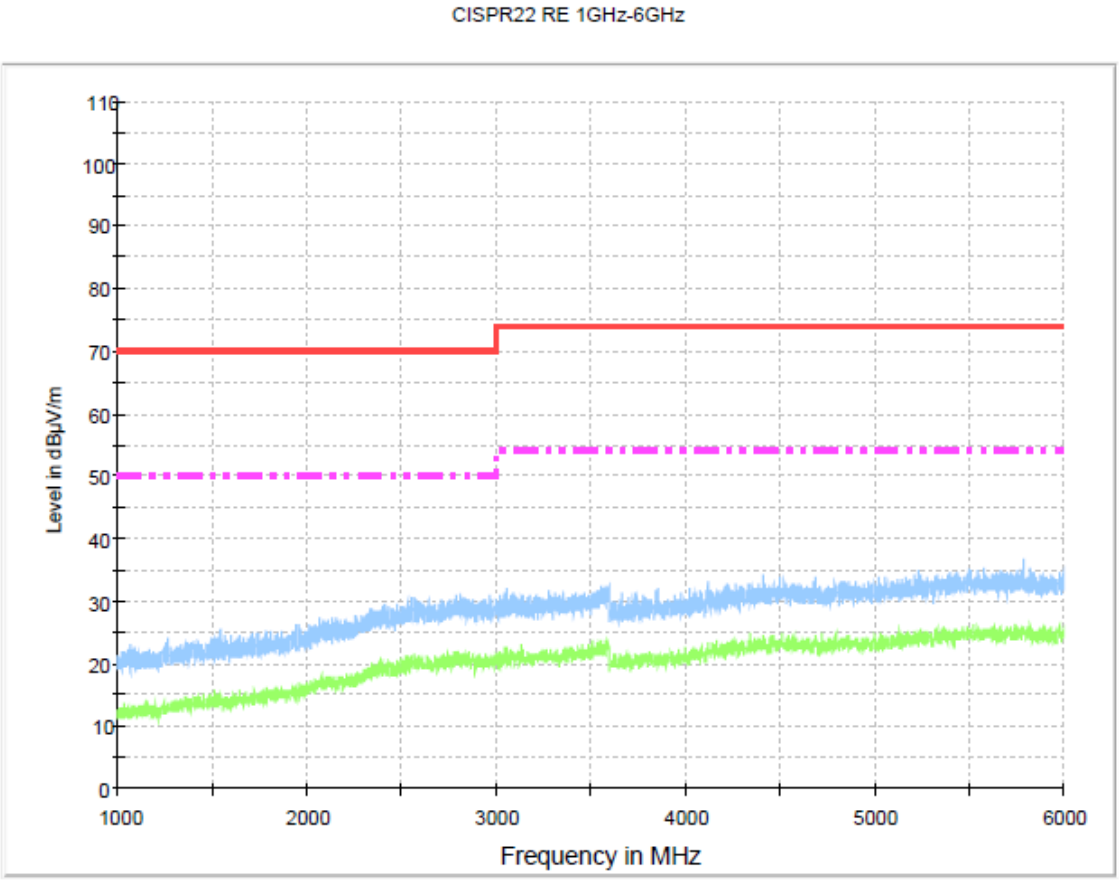
Vertical



Frequency (GHz)	Receiver PK Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Receiver AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1.0	*	70.00	*	*	50.00	*
2.0	*	70.00	*	*	50.00	*
3.0	*	70.00	*	*	50.00	*
4.0	*	74.00	*	*	54.00	*
5.0	*	74.00	*	*	54.00	*
6.0	*	74.00	*	*	54.00	*

"*" means the emission level is 6dB lower than the relevant limit.

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7.2 EMS (Immunity)

7.2.1 Performance Criteria of EN 301 489-3, subclause 6.3 table 4

Class 1 SRD Equipment		
Criteria	During Test	After Test
A	Operate as intended No loss of function For equipment type II the minimum performance shall be 12 dB SINAD No unintentional responses	Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Class 2 SRD Equipment		
Criteria	During Test	After Test
A	Operate as intended No loss of function For equipment type II the minimum performance shall be 6 dB SINAD No unintentional responses	Operate as intended For equipment type II the communication link shall be maintained No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Class 3 SRD Equipment		
Criteria	During Test	After Test
A & B	May be loss of function (one or more) No unintentional responses	Operate as intended, for equipment type II the communication link may be lost, but shall be recoverable by user No degradation of performance Lost functions shall be self-recoverable

Remark: The E.U.T belonged to Type I, class 3.

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7.2.2 Special conditions for EMC immunity tests in EN301489-3 table 6

Reference to clauses in EN 301 489-1	Special product-related conditions, additional to or modifying the test conditions in EN 301 489-1, clause 9
9.2.2: Test method; Radio frequency electromagnetic field	**Attention:** The width of the steps for the test frequency increments is class-dependent: -for SRDs of class 1 or class 2, the stepped frequency increments shall be 1 % of the momentary used test frequency; -for SRDs of class 3, the stepped frequency increments shall be 10 % of the momentary used test frequency.
9.5.2: Test method; Radio frequency, common mode	**Attention:** The width of the steps for the test frequency increments is class-dependent: -for SRDs of class 1 or class 2, the stepped frequency increments shall be 1 % of the momentary used test frequency in the frequency range 5 MHz to 80 MHz; -for SRDs of class 3, the stepped frequency increments shall be10 % of the momentary used test frequency in the frequency range 5 MHz to 80 MHz.
9.7.3: Performance criteria; Voltage dips and interruptions	**Attention:** The performance criteria are equipment class dependent: For a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms the performance criteria CT or CR specified in clauses 6.4 or 6.6 shall apply as appropriate. For a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms the following class-dependent performance criteria shall apply: -for transmitters, belonging to class 1 equipment, the performance criteria CT (see clause 6.4); -for transmitters, belonging to class 2 or 3 equipment, the performance criteria TT (see clause 6.5); -for receivers, belonging to class 1 equipment, the performance criteria CR (see clause 6.6); -for receivers, belonging to class 2 or 3 equipment, the performance criteria TR (see clause 6.7). For a voltage interruption corresponding to a reduction of the supply voltage of > 95 % for 5 000 ms the performance criteria TT or TR specified in clauses 6.5 or 6.7 shall apply as appropriate.

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7.2.3 ElectroStatic Discharge (ESD)

Test Method: EN301489-3 Clause 7.2,EN 61000-4-2

Discharge Voltage: Contract Discharge: ±2kV, ±4kV
Air Discharge: ±2kV, ±4kV, ±8kV
HCP/VCP: ±2kV, ±4kV

Polarity: Positive & Negative

Number of Discharge: Minimum 10 times at each test point

Discharge Mode: Single Discharge

Discharge Period: 1 second minimum.

E.U.T Operation:

Application: Enclosure.

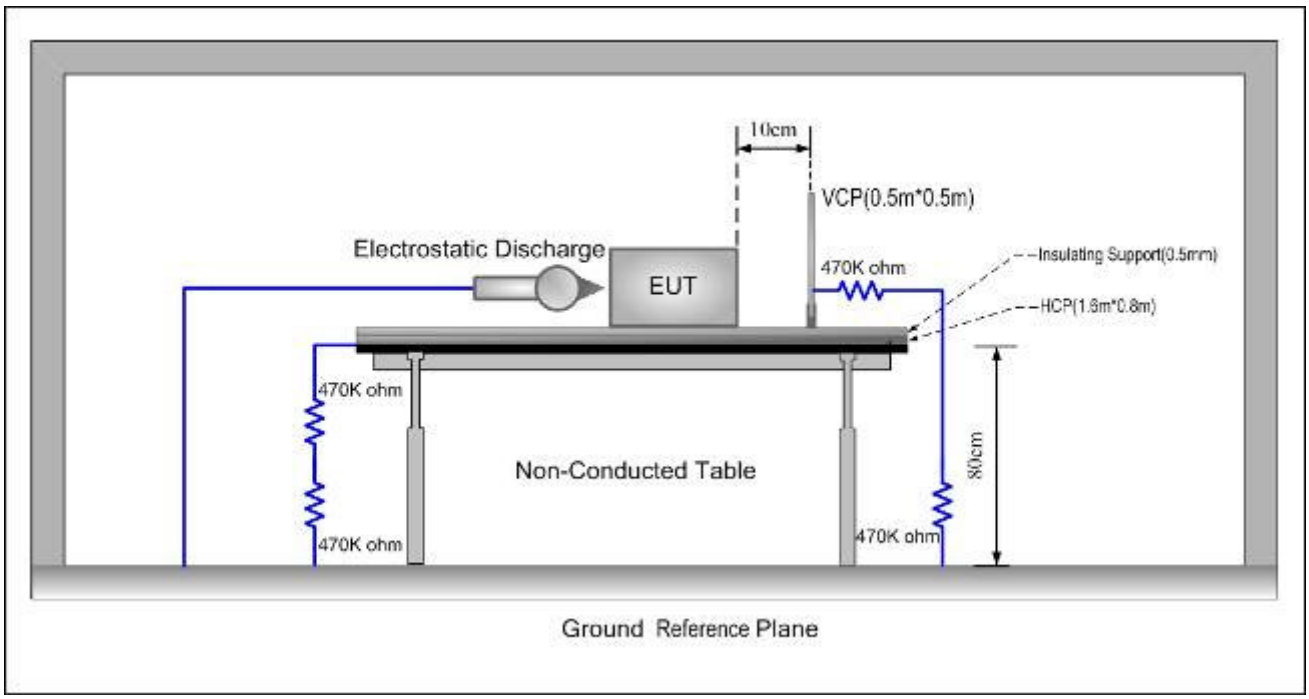
Ambient: Temp.: 21 °C, Humid.: 40 % Press.: 1010 mbar

Status: Test in working mode,for the 13.56MHz RF module, just test the indirect mode.

Test Limit Criteria B

Equipment Used: Refer to section 5 for details.

Test Configuration:



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Test procedure:

1. Contact discharges to the conductive surfaces and to coupling planes:

The E.U.T was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points was subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode. Tests were performed at a maximum repetition rate of one discharge per second.

Air discharge at slots and apertures, and insulating surfaces:

On those parts of the E.U.T where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. A minimum of 10 single air discharges were applied to the selected test point for each such area.

The application of electrostatic discharges to the contacts of open connectors was not required by this

standard.

2. The E.U.T was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).

3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the E.U.T with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thinkness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between E.U.T and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.

4. During the contact discharges, the tip of the discharge electrode was touched the E.U.T before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the E.U.T.

5. After each discharge, the ESD generator was removed from the E.U.T, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances were used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

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Measurement Record:

Indirect Application (HCP & VCP) Test Results

Observations: Test points: 1. All sides.

The car normal running.

Indirect Application			Test Results	
Discharge Level (kV)	Pulse No.	Test Point	Horizontal Coupling	Vertical Coupling
± 2, 4	10 for every level	1	B	B

Results: PASS

A: No degradation in the performance of the E.U.T was observed.

B: May show degradation of performance, function shall be self-recoverable after the test.

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7.2.4 Radiated Immunity 80MHz to 1GHz, 1.4GHz to 2.7GHz

Test Method: EN301489-3 Clause 7.2,EN 61000-4-3

Frequency Range: 80MHz to 1GHz,1.4G to 2.7GHz

Antenna Polarization: Horizontal & Vertical

Test frequency: Refer to measurement record.

E.U.T Operation:

Application: Enclosure.

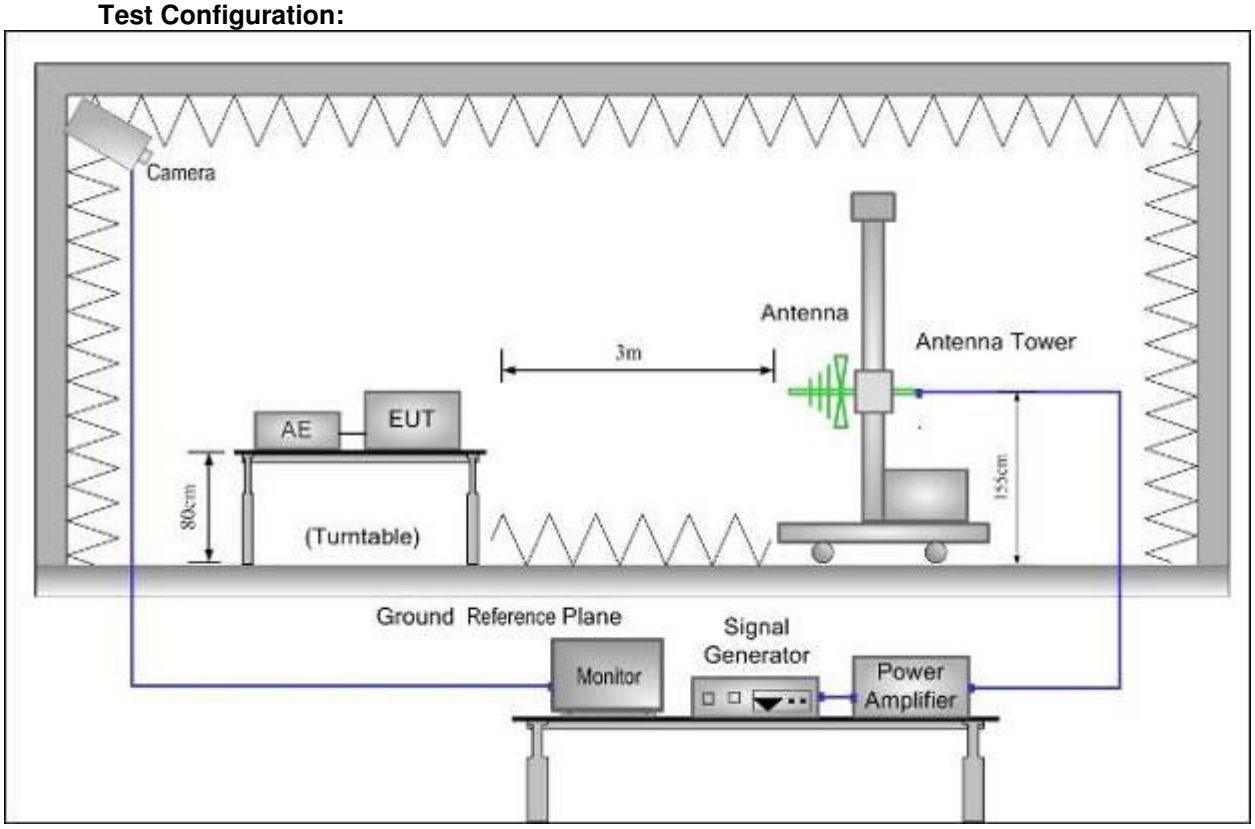
Ambient: Temp.: 22 °C, Humid.: 41 % Press.: 1010 Mbar

Status: Test in working mode (operating frequency is 13.56MHz).

Test Limit Criteria A

Equipment Used: Refer to section 5 for details.

Test Configuration:



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Test procedure:

1. For table-top equipment, the E.U.T was placed in the chamber on a non-conductive table 0.1m high. For arrangement of floor-standing equipment, the E.U.T was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the E.U.T may be tested in the same manner as table top items.
2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the E.U.T shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
3. The E.U.T was initially placed with one face coincident with the calibration plane. The E.U.T face being illuminated was contained within the UFA (Uniform Field Area).
4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary.Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value.
5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the E.U.T to be exercised and to respond, and was not less than 0,5 s.
6. The test normally was performed with the generating antenna facing each side of the E.U.T.
7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
8. The E.U.T was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the E.U.T.

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7.2.4.1 Measurement Results

Frequency	Level	Modulation	Antenna Polarization	E.U.T Face	Result / Observations
80 MHz-1 GHz 1.4 -2.7GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1% increment Dwell Time: 3s	V	Front	A
			H		A
			V	Rear	A
			H		A
			V	Left	A
			H		A
			V	Right	A
			H		A
			V	Top	A
			H		A
			V	Bottom	A
			H		A

Remarks:

Front: the front of the E.U.T faces to transmitting antenna.

A: No degradation in the performance of the E.U.T. was observed.

N/A: not applicable.

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8 Setup Photos

8.1 Radiated Emission Test Setup

30MHz-1GHz:

1G-6GHz:

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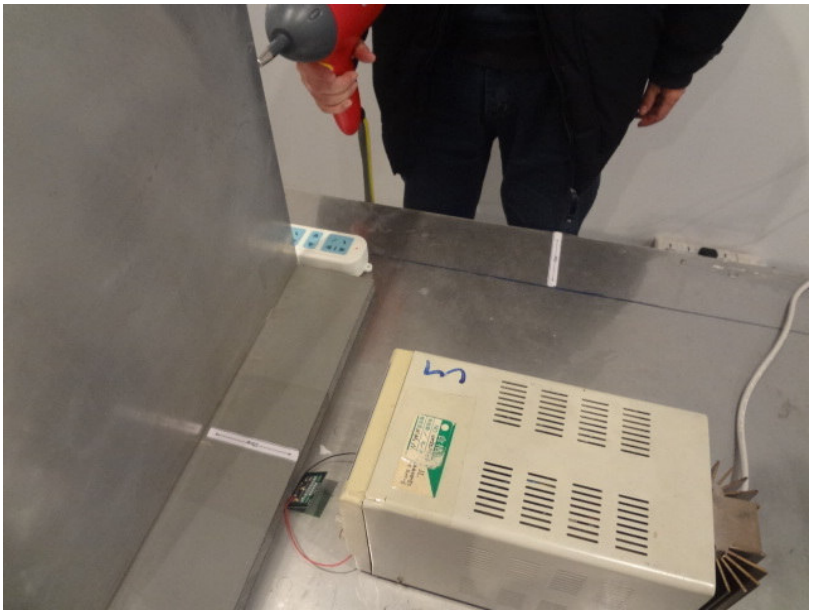
8.2 Radiated Immunity Test Setup

8.3 ESD test setup



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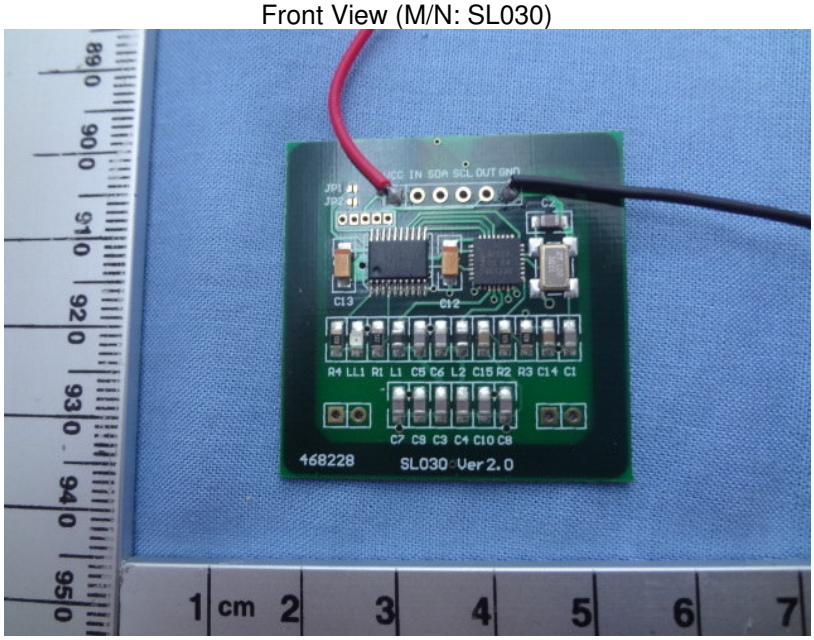
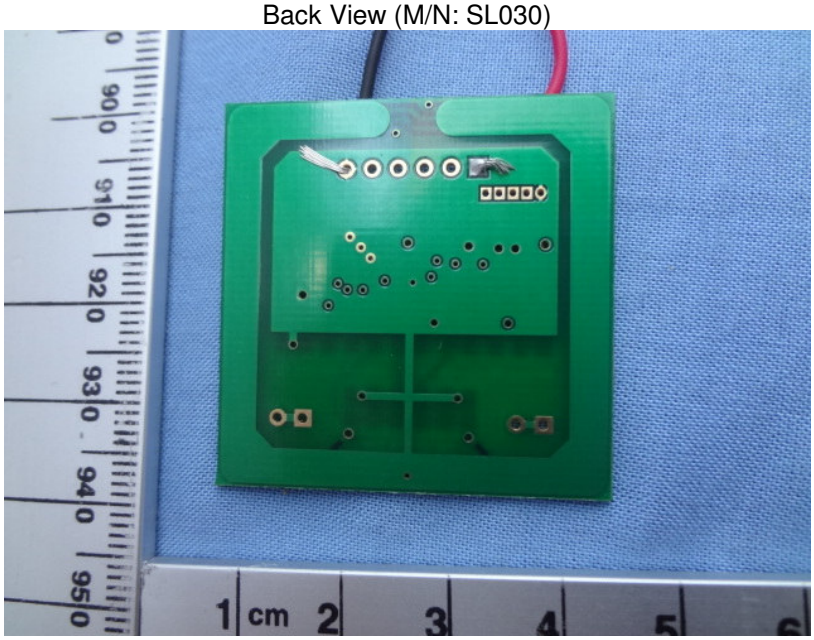
9 EUT Construction Photoghaphs

Front View (M/N: SL030)



Back View (M/N: SL030)



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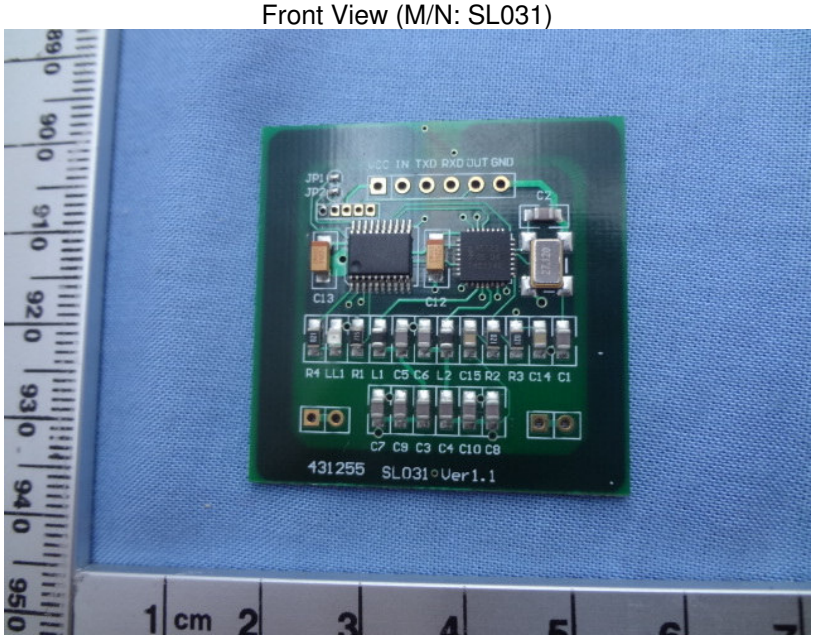
Front View (M/N: SL031)



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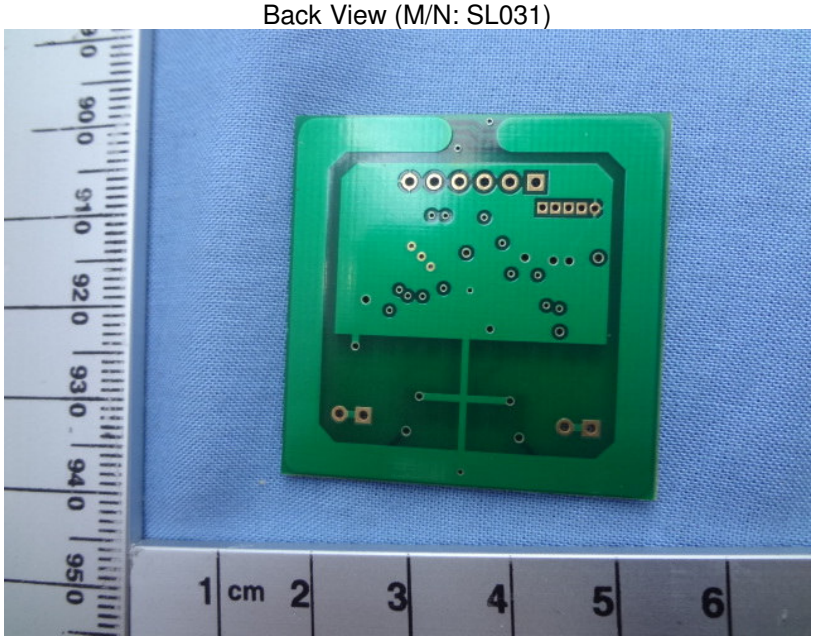

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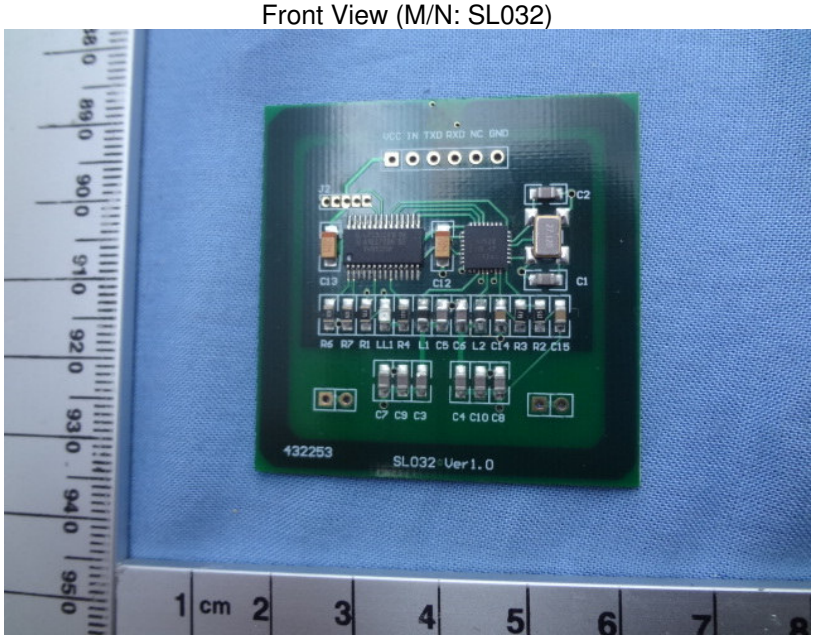
Front View (M/N: SL032)



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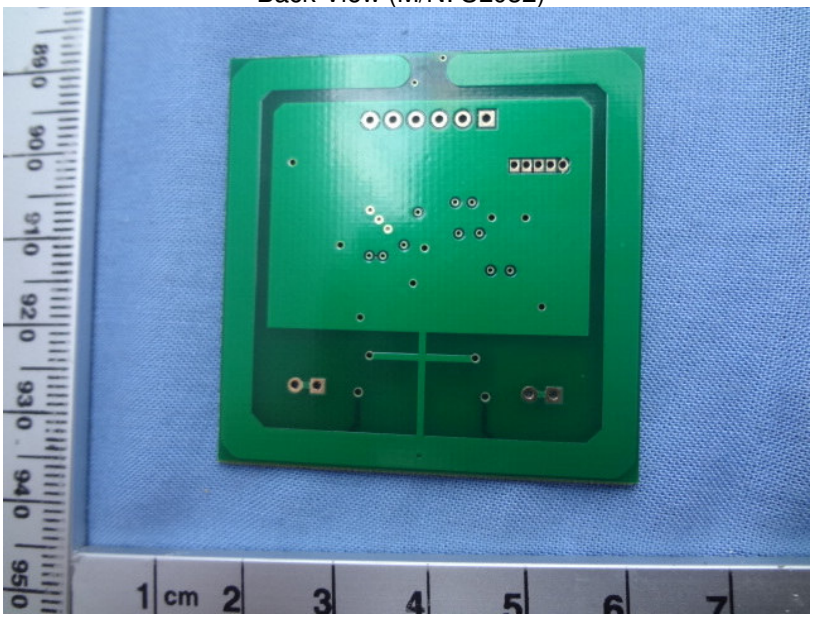

The end of report

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