



FCC TEST REPORT

FOR

Eccel Technology Ltd

Pepper C1 MUX RFID Reader

Test Model: v2

Prepared for : Eccel Technology Ltd
Address : Unit 16b Fir Tree Lane Groby, LE6 0FH, Leicester, United Kingdom

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : April 24, 2024
Number of tested samples : 2
Sample No. : A240425059-1, A240425059-2
Serial number : Prototype
Date of Test : April 24, 2024 ~ May 11, 2024
Date of Report : May 13, 2024



**FCC TEST REPORT**
FCC CFR 47 PART 15 C (15.225)**Report Reference No.** : **LCSA04264009ED****Date of Issue** : May 13, 2024**Testing Laboratory Name**..... : **Shenzhen LCS Compliance Testing Laboratory Ltd.****Address**..... : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China**Testing Location/ Procedure**..... : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □**Applicant's Name**..... : **Eccel Technology Ltd****Address**..... : Unit 16b Fir Tree Lane Groby, LE6 0FH, Leicester, United Kingdom**Test Specification****Standard**..... : FCC CFR 47 PART 15 C(15.225)**Test Report Form No**..... : LCSEMC-1.0**TRF Originator**..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**Master TRF**..... : Dated 2011-03**Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen LCS Compliance Testing Laboratory Ltd. is acknowledged as copyright owner and source of the material. Shenzhen LCS Compliance Testing Laboratory Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test Item Description..... : **Pepper C1 MUX RFID Reader****Trade Mark**..... : Eccel**Test Model**..... : v2**Ratings**..... : DC 3.3-5V, 500mA**Result** : **Positive****Compiled by:**

Li Huan/ Administrator

Supervised by:

Cary Luo/ Technique principal

Approved by:

Gavin Liang/ Manager



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

**FCC -- TEST REPORT**

Test Report No. :	LCSA04264009ED	<u>May 13, 2024</u> Date of issue
--------------------------	-----------------------	--------------------------------------

Test Model.....	: v2
EUT.....	: Pepper C1 MUX RFID Reader
Applicant.....	: Eccel Technology Ltd
Address.....	: Unit 16b Fir Tree Lane Groby, LE6 0FH, Leicester, United Kingdom
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: Eccel Technology Limited Sp. z o.o. Oddział w Polsce
Address.....	: Bydgoskich Przemyslowcow 6A, 85-862 Bydgoszcz, Poland
Telephone.....	:
Fax.....	:
Factory.....	: Eccel Technology Limited Sp. z o.o. Oddział w Polsce
Address.....	: Bydgoskich Przemyslowcow 6A, 85-862 Bydgoszcz, Poland
Telephone.....	: /
Fax.....	: /

Test Result	Positive
--------------------	-----------------

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	May 13, 2024	Initial Issue	---





TABLE OF CONTENTS

1. GENERAL INFORMATION	6
1.1 Description of Device (EUT)	6
1.2 Host System Configuration List and Details	7
1.3 External I/O	7
1.4 Description of Test Facility	7
1.5 Statement of The Measurement Uncertainty	8
1.6 Measurement Uncertainty	8
1.7 Description of Test Modes	8
2. TEST METHODOLOGY	9
2.1. EUT Configuration	9
2.2. EUT Exercise	9
2.3 General Test Procedures	9
3. SYSTEM TEST CONFIGURATION	10
3.1. Justification	10
3.2. EUT Exercise Software	10
3.3. Special Accessories	10
3.4. Block Diagram/Schematics	10
3.5. Equipment Modifications	10
3.6. Test Setup	10
4. SUMMARY OF TEST RESULTS	11
5. RADIATED MEASUREMENT	12
5.1. Radiated Emission	12
5.2. Field Strength of Fundamental Emissions and Mask Measurement	33
6. BANDWIDTH OF THE OPERATING FREQUENCY	39
6.1. Standard Applicable	39
6.2. Test Result	39
7. FREQUENCY STABILITY MEASUREMENT	47
7.1 Standard Applicable	47
7.2 Test Result	47
8. LINE CONDUCTED EMISSIONS	51
8.1. Standard Applicable	51
8.2. Block Diagram of Test Setup	51
8.3. Test Results	51
9. ANTENNA REQUIREMENTS	52
9.1 Standard Applicable	52
9.2 Antenna Connected Construction	52
10. LIST OF MEASURING EQUIPMENTS	53
11. TEST SETUP PHOTOGRAPHS OF EUT	54
12. EXTERIOR PHOTOGRAPHS OF THE EUT	54
13. INTERIOR PHOTOGRAPHS OF THE EUT	54





1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT : Pepper C1 MUX RFID Reader

Test Model : v2

Power Supply : DC 3.3-5V, 500mA

Hardware Version : 2.0

Software Version : 2.50

Bluetooth :

Frequency Range : 2402MHz ~ 2480MHz

Channel Number : 79 channels for Bluetooth V4.2(DSS)
40 channels for Bluetooth V4.2 (DTS)

Channel Spacing : 1MHz for Bluetooth V4.2 (DSS)
2MHz for Bluetooth V4.2 (DTS)

Modulation Type : GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V4.2(DSS)
GFSK for Bluetooth V4.2 (DTS)

Bluetooth Version : V4.2

Antenna Description : PCB Antenna, -13.43dBi(Max.)

2.4G WLAN :

Frequency Range : 2412MHz~2462MHz

Channel Spacing : 5MHz

Channel Number : 11 Channels for 20MHz bandwidth (2412MHz~2462MHz)
7 Channels for 40MHz bandwidth (2422MHz~2452MHz)

Modulation Type : IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Antenna Description : PCB Antenna, -13.43dBi(Max.)

NFC :

Operating Frequency : 13.56MHz

Modulation Type : ASK

Antenna Description : PCB Track Loop Antennas*8, 0dBi(Max.)



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



1.2 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	Notebook	B470	WB05067151	FCC

Note: Auxiliary equipment is provided by the laboratory.

1.3 External I/O

I/O Port Description	Quantity	Cable
--	--	--

1.4 Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



1.5 Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6 Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
	:	30MHz~200MHz	±2.96dB	(1)
	:	200MHz~1000MHz	±3.10dB	(1)
	:	1GHz~26.5GHz	±3.80dB	(1)
	:	26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)
Output power	:	1GHz-40GHz	±0.57dB	(1)
Power Spectral Density	:	1GHz-40GHz	±1.2dB	(1)
Occupied Channel Bandwidth	:	1GHz-40GHz	±5%	(1)
Conducted RF Spurious Emission	:	9kHz-40GHz	±1.80dB	(1)
Emissions in Restricted Bands	:	1GHz-40GHz	±2.47dB	(1)
Frequency Stability	:	1GHz-40GHz	±25Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7 Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in Y position.

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power.





2. 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.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.225 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz and 1.5 m above ground plane above 1GHz. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013.



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (C1-client.exe) provided by applicant.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
/	/	/	/	/	/	/	/

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.





4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C		
Test Items	FCC Rules	Result
Line Conducted Emissions	§15.207(a)	N/A
Field Strength of Fundamental Emissions	§15.225(a)(b)(c)	PASS
Radiated Emissions	§15.225(d) & §15.209	PASS
20dB Bandwidth	§ 15.215	PASS
Frequency Stability	§15.225(e)	PASS
Antenna Requirement	§15.203	PASS





5. RADIATED MEASUREMENT

5.1. Radiated Emission

5.1.1. Standard Applicable

According to §15.209/ §15.205

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2\)
13.36-13.41			

1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.1.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10 th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

5.1.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.0 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.





2) Sequence of testing 30 MHz to 1 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.





3) Sequence of testing 1 GHz to 18 GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

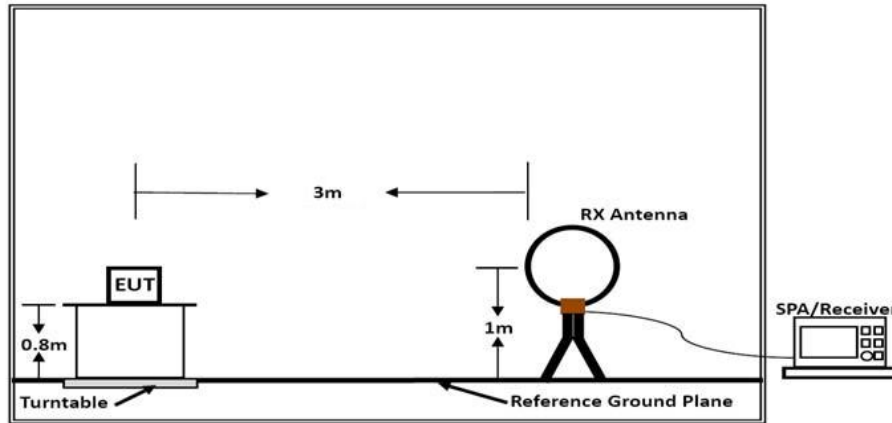
Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

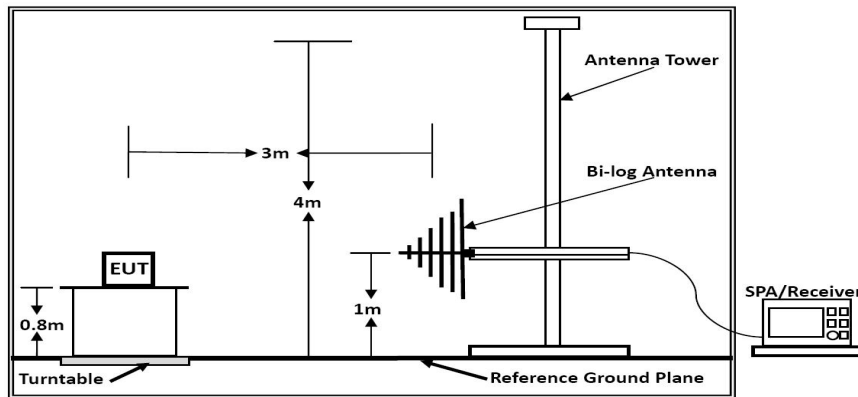




5.1.4. Test Setup Layout



Below 30MHz



Below 1GHz

5.1.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	





5.1.6. Test Results

Temperature	23.8℃	Humidity	52.5%
Test Engineer	Paddi Chen	Configurations	NFC

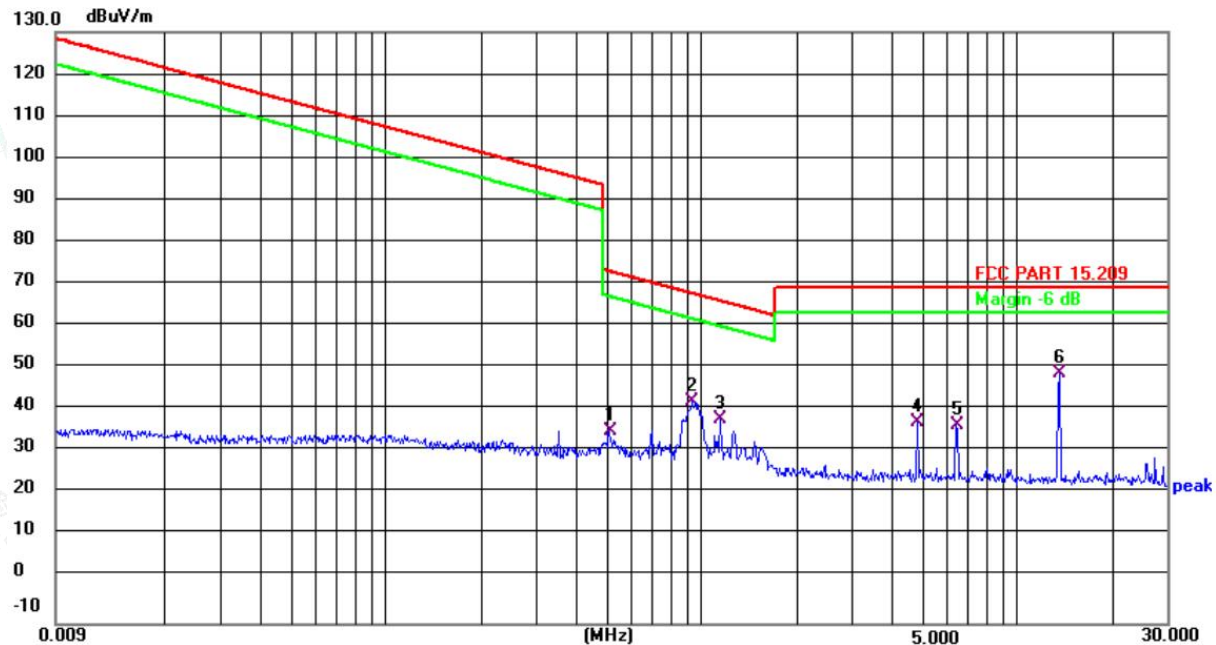
PASS.

The test data please refer to following page:

ANT1

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.5111	45.46	-9.69	35.77	73.43	-37.66	QP
2	0.9394	52.13	-9.30	42.83	68.15	-25.32	QP
3	1.1505	47.64	-9.27	38.37	66.39	-28.02	QP
4	4.8357	47.12	-9.40	37.72	69.54	-31.82	QP
5	6.4234	46.31	-9.40	36.91	69.54	-32.63	QP
6	13.6584	59.51	-10.02	49.49	69.54	-20.05	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

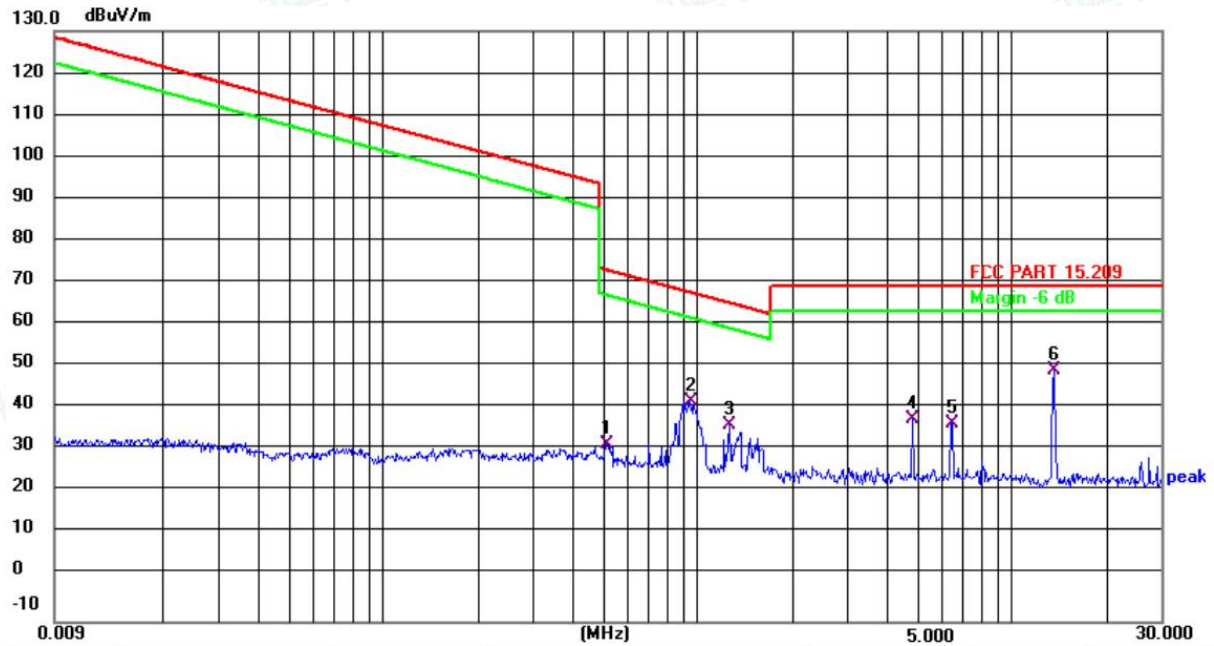
Scan code to check authenticity



ANT2

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.5151	41.77	-9.68	32.09	73.37	-41.28	QP
2	0.9467	51.77	-9.30	42.47	68.08	-25.61	QP
3	1.2681	45.85	-9.28	36.57	65.54	-28.97	QP
4	4.8357	47.36	-9.40	37.96	69.54	-31.58	QP
5	6.4756	46.49	-9.40	37.09	69.54	-32.45	QP
6	13.6584	59.63	-10.02	49.61	69.54	-19.93	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

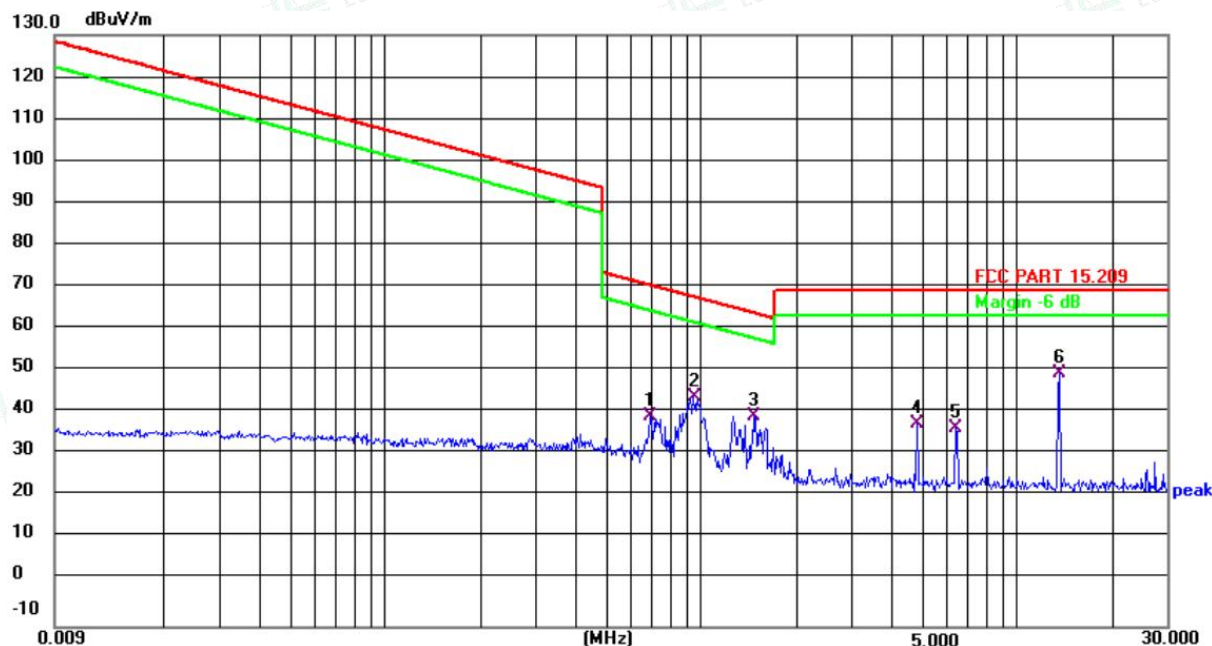
Scan code to check authenticity



ANT3

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.6902	49.40	-9.52	39.88	70.82	-30.94	QP
2	0.9468	53.89	-9.30	44.59	68.08	-23.49	QP
3	1.4795	49.23	-9.31	39.92	64.20	-24.28	QP
4	4.8357	47.53	-9.40	38.13	69.54	-31.41	QP
5	6.4233	46.39	-9.40	36.99	69.54	-32.55	QP
6	13.6584	59.98	-10.02	49.96	69.54	-19.58	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

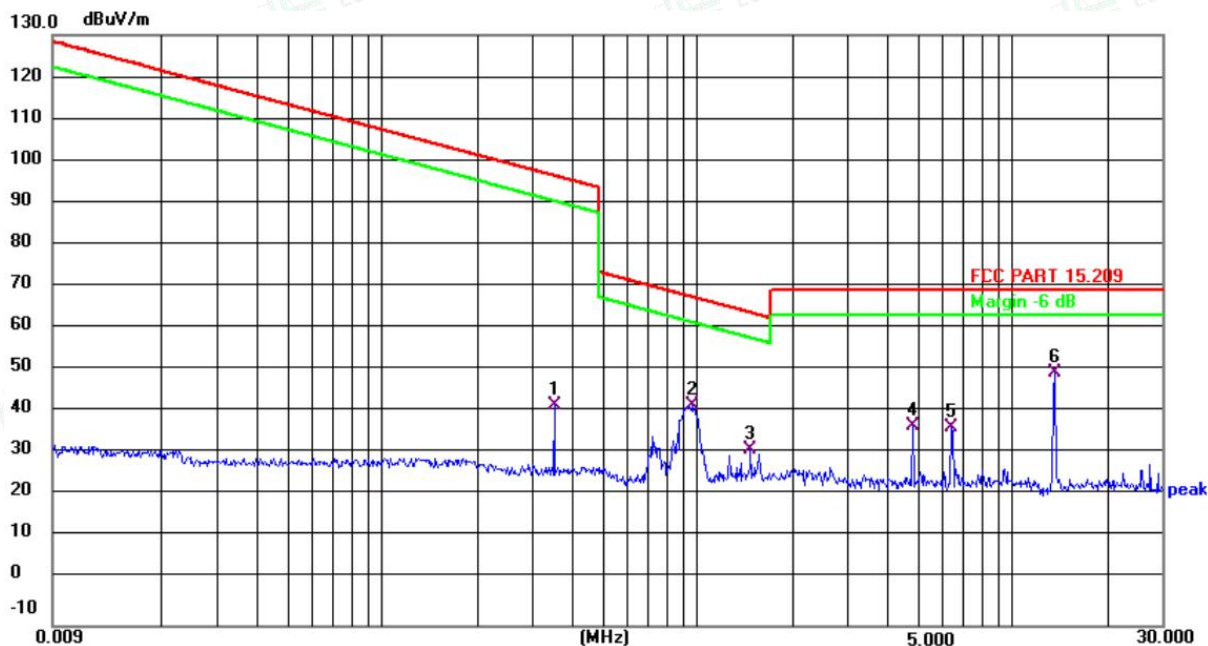
Scan code to check authenticity



ANT4

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.3518	52.12	-9.73	42.39	96.66	-54.27	QP
2	0.9625	51.64	-9.27	42.37	67.94	-25.57	QP
3	1.4795	41.24	-9.31	31.93	64.20	-32.27	QP
4	4.8357	46.89	-9.40	37.49	69.54	-32.05	QP
5	6.4233	46.54	-9.40	37.14	69.54	-32.40	QP
6	13.6584	60.13	-10.02	50.11	69.54	-19.43	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

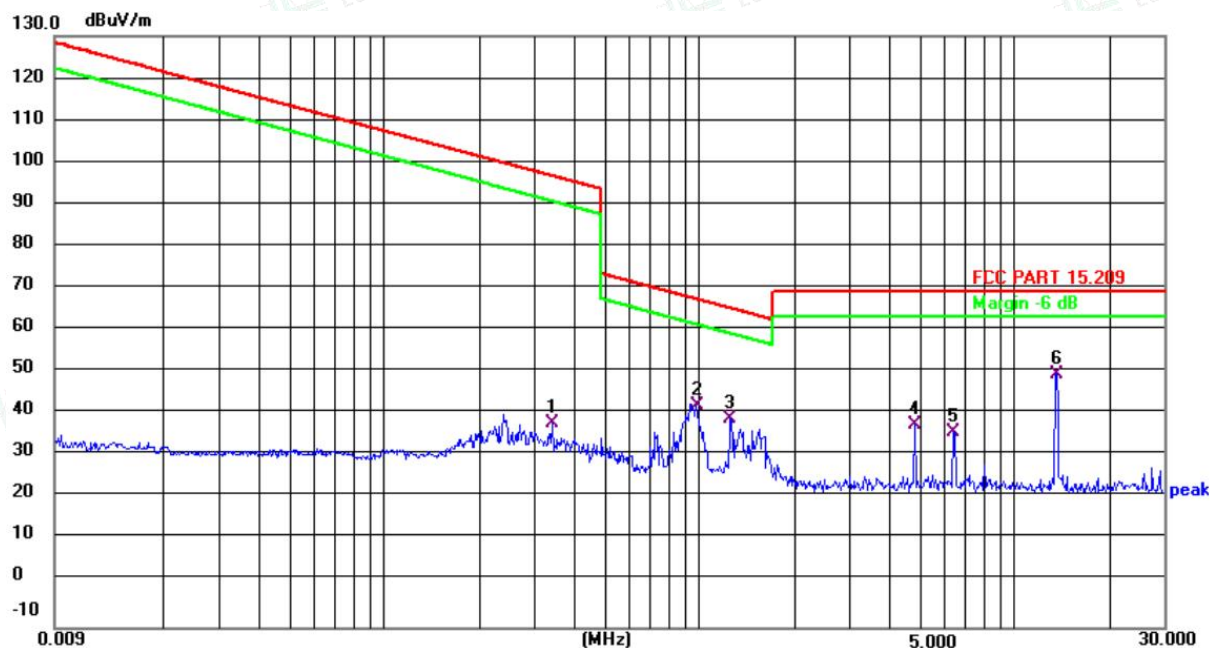
Scan code to check authenticity



ANT5

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.3435	48.13	-9.74	38.39	96.87	-58.48	QP
2	0.9780	52.05	-9.27	42.78	67.80	-25.02	QP
3	1.2579	48.92	-9.28	39.64	65.61	-25.97	QP
4	4.8357	47.39	-9.40	37.99	69.54	-31.55	QP
5	6.4233	45.95	-9.40	36.55	69.54	-32.99	QP
6	13.6584	60.22	-10.02	50.20	69.54	-19.34	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

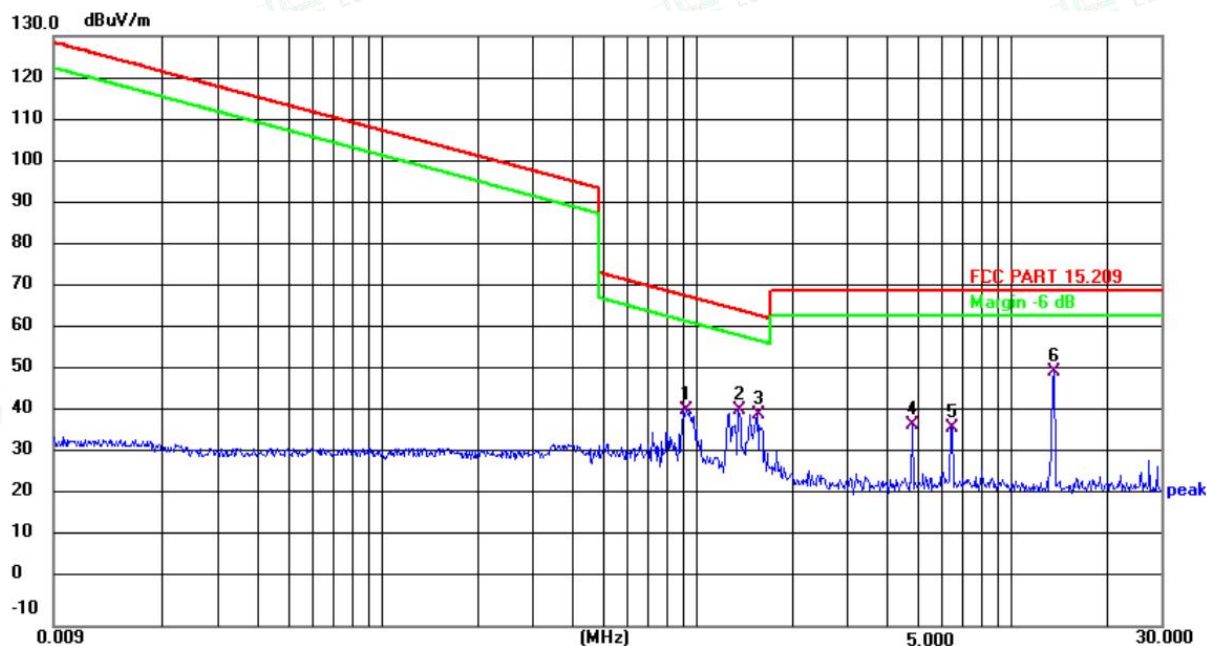
Scan code to check authenticity



ANT6

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.9242	50.68	-9.32	41.36	68.29	-26.93	QP
2	1.3530	50.42	-9.29	41.13	64.98	-23.85	QP
3	1.5531	49.58	-9.32	40.26	63.78	-23.52	QP
4	4.8357	47.06	-9.40	37.66	69.54	-31.88	QP
5	6.4756	46.37	-9.40	36.97	69.54	-32.57	QP
6	13.6584	60.38	-10.02	50.36	69.54	-19.18	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

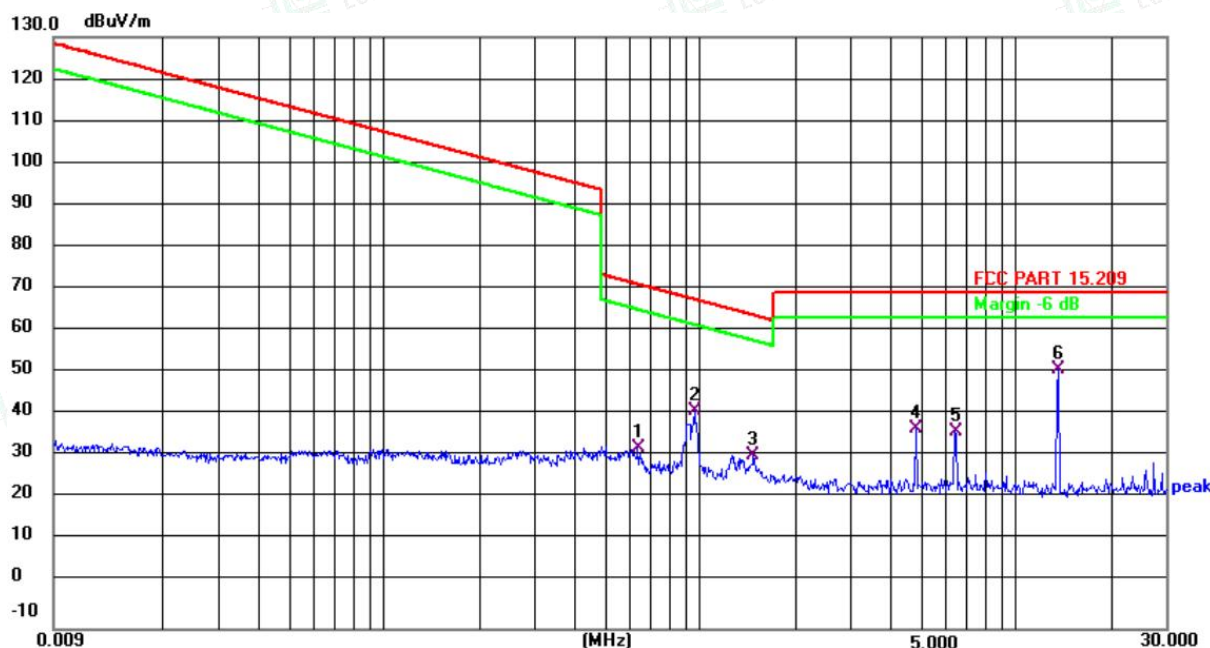
Scan code to check authenticity



ANT7

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.6363	42.56	-9.58	32.98	71.53	-38.55	QP
2	0.9625	50.96	-9.27	41.69	67.94	-26.25	QP
3	1.4795	40.36	-9.31	31.05	64.20	-33.15	QP
4	4.8357	46.95	-9.40	37.55	69.54	-31.99	QP
5	6.4234	46.09	-9.40	36.69	69.54	-32.85	QP
6	13.6584	61.61	-10.02	51.59	69.54	-17.95	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

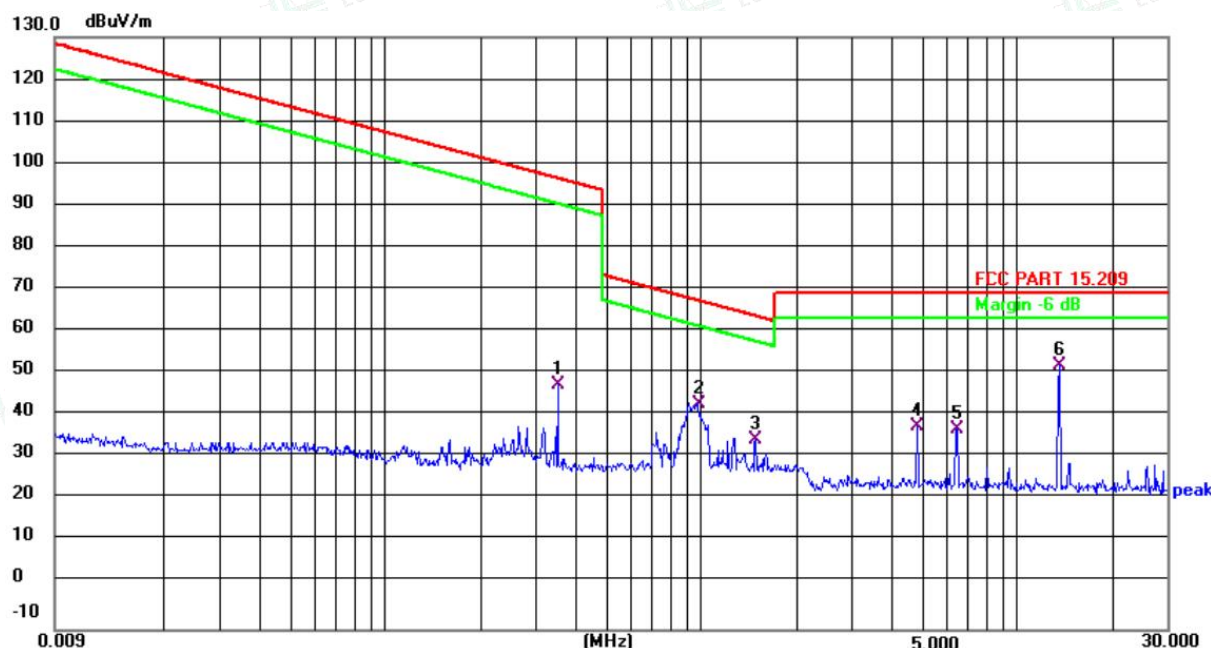
Scan code to check authenticity



ANT8

9 KHz~30MHz

Note: Only recorded the worst test result.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.3519	57.66	-9.73	47.93	96.66	-48.73	QP
2	0.9781	52.60	-9.27	43.33	67.80	-24.47	QP
3	1.4916	44.34	-9.31	35.03	64.13	-29.10	QP
4	4.8357	47.52	-9.40	38.12	69.54	-31.42	QP
5	6.4234	46.90	-9.40	37.50	69.54	-32.04	QP
6	13.6584	62.33	-10.02	52.31	69.54	-17.23	QP

*Note: Measurement = Reading Level + Factor

Margin = Measurement - Limit.

All NFC antenna data have been evaluated, and only the worst mode data is included in the report(NFC ANT 1)



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

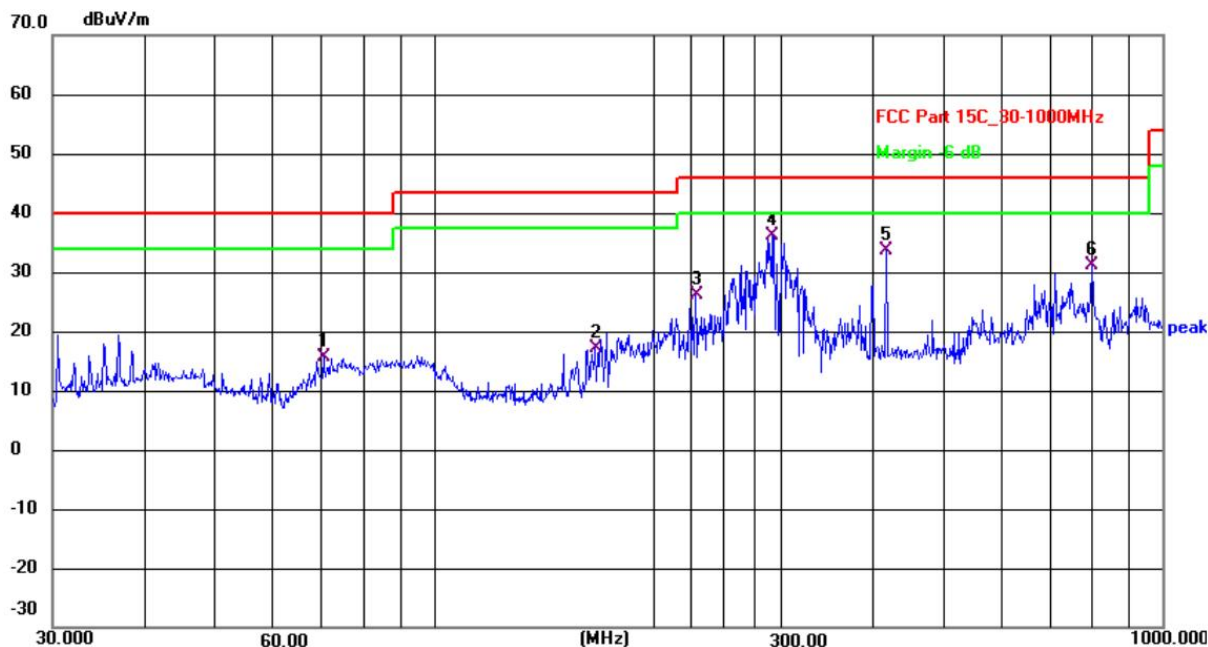


Temperature	23.8℃	Humidity	52.1%
Test Engineer	Paddi Chen	Configurations	NFC

RS232:

30MHz ~ 1GHz

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	70.5835	35.10	-19.49	15.61	40.00	-24.39	QP
2	166.6512	36.76	-19.58	17.18	43.50	-26.32	QP
3	228.4903	42.68	-16.59	26.09	46.00	-19.91	QP
4	291.0358	51.62	-15.53	36.09	46.00	-9.91	QP
5	417.6409	47.46	-13.83	33.63	46.00	-12.37	QP
6	801.7862	40.97	-9.89	31.08	46.00	-14.92	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

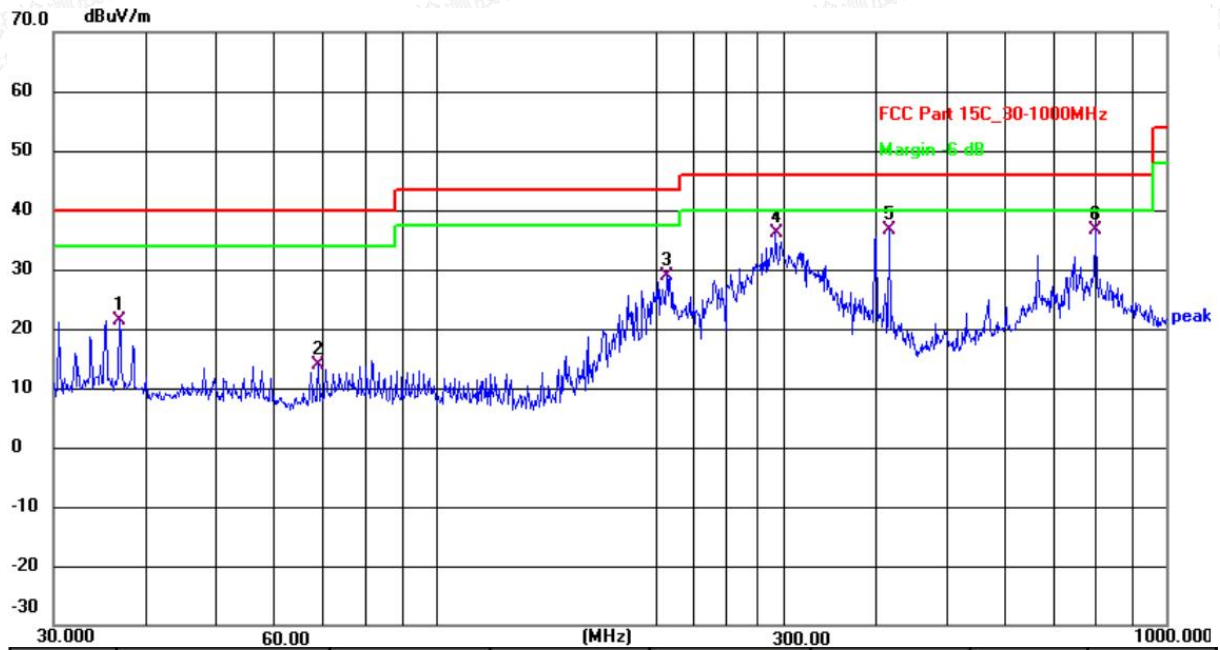
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8952	39.13	-17.70	21.43	40.00	-18.57	QP
2	69.1140	33.17	-19.41	13.76	40.00	-26.24	QP
3	207.1225	46.00	-17.21	28.79	43.50	-14.71	QP
4	292.0582	51.55	-15.54	36.01	46.00	-9.99	QP
5	417.6409	50.95	-14.42	36.53	46.00	-9.47	QP
6	801.7862	46.40	-9.89	36.51	46.00	-9.49	QP

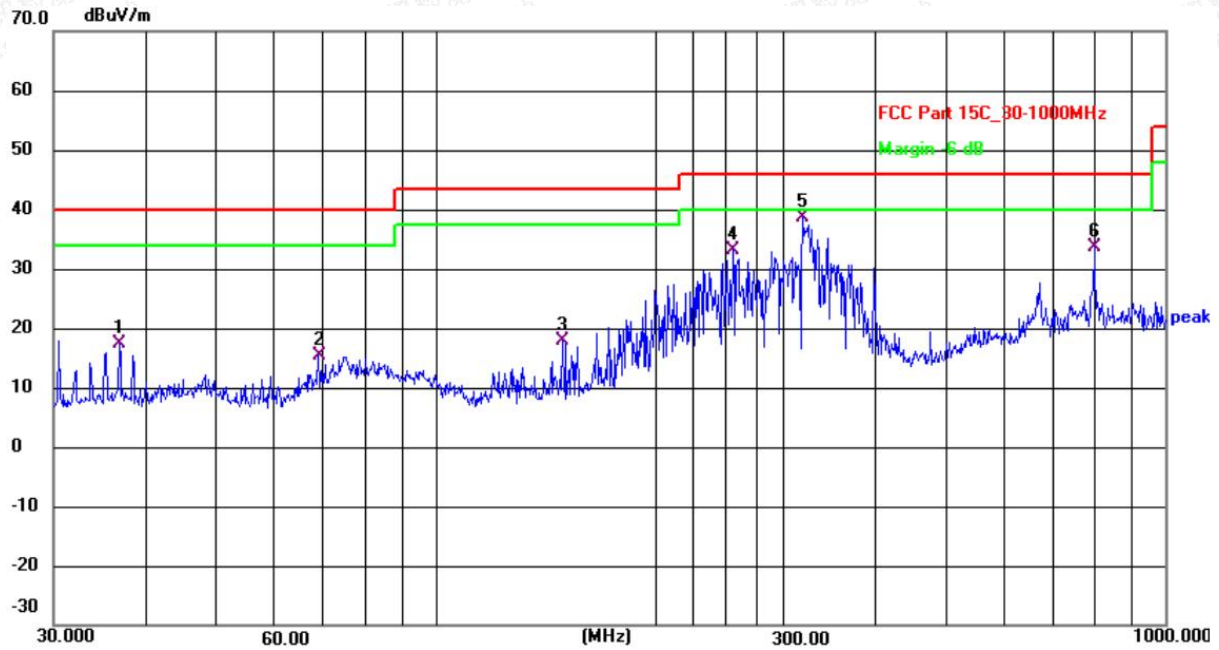


Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

**RS485:**
Horizontal:

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8953	35.13	-17.69	17.44	40.00	-22.56	QP
2	69.1141	34.80	-19.41	15.39	40.00	-24.61	QP
3	149.4857	37.76	-19.88	17.88	43.50	-25.62	QP
4	255.6231	48.69	-15.55	33.14	46.00	-12.86	QP
5	318.8170	53.07	-14.54	38.53	46.00	-7.47	QP
6	798.9797	43.52	-9.96	33.56	46.00	-12.44	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

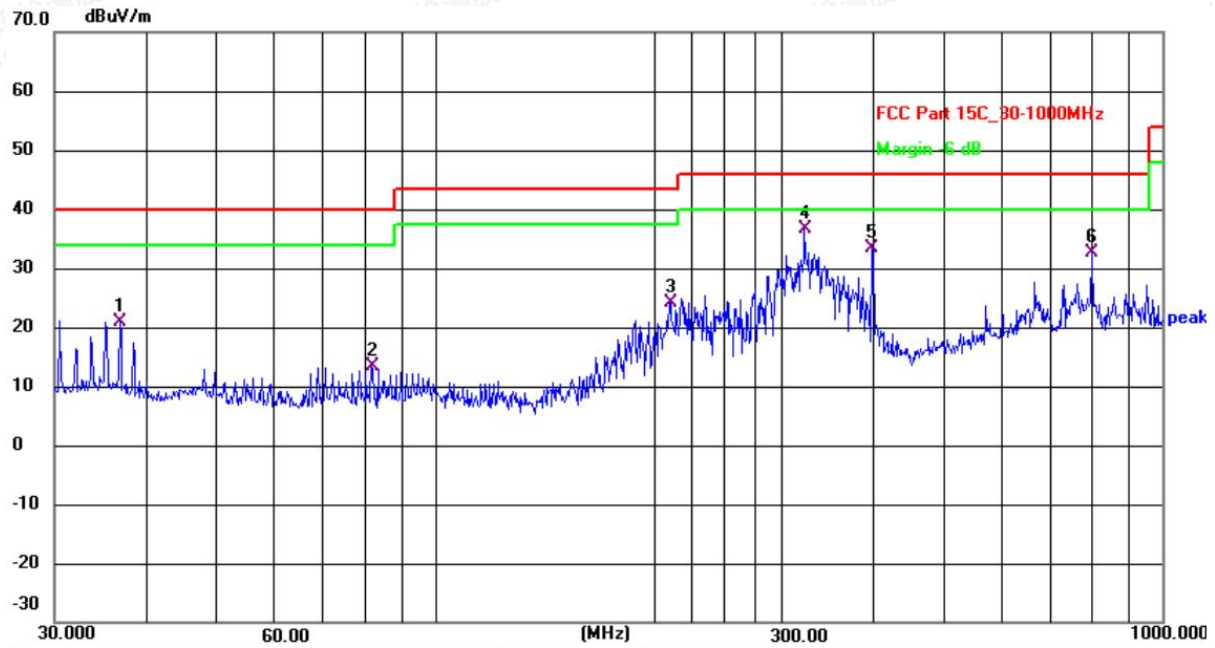
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8953	38.66	-17.69	20.97	40.00	-19.03	QP
2	81.7833	33.05	-19.70	13.35	40.00	-26.65	QP
3	210.0482	41.30	-17.14	24.16	43.50	-19.34	QP
4	322.1886	50.88	-14.35	36.53	46.00	-9.47	QP
5	399.0302	47.84	-14.43	33.41	46.00	-12.59	QP
6	798.9797	42.70	-9.96	32.74	46.00	-13.26	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

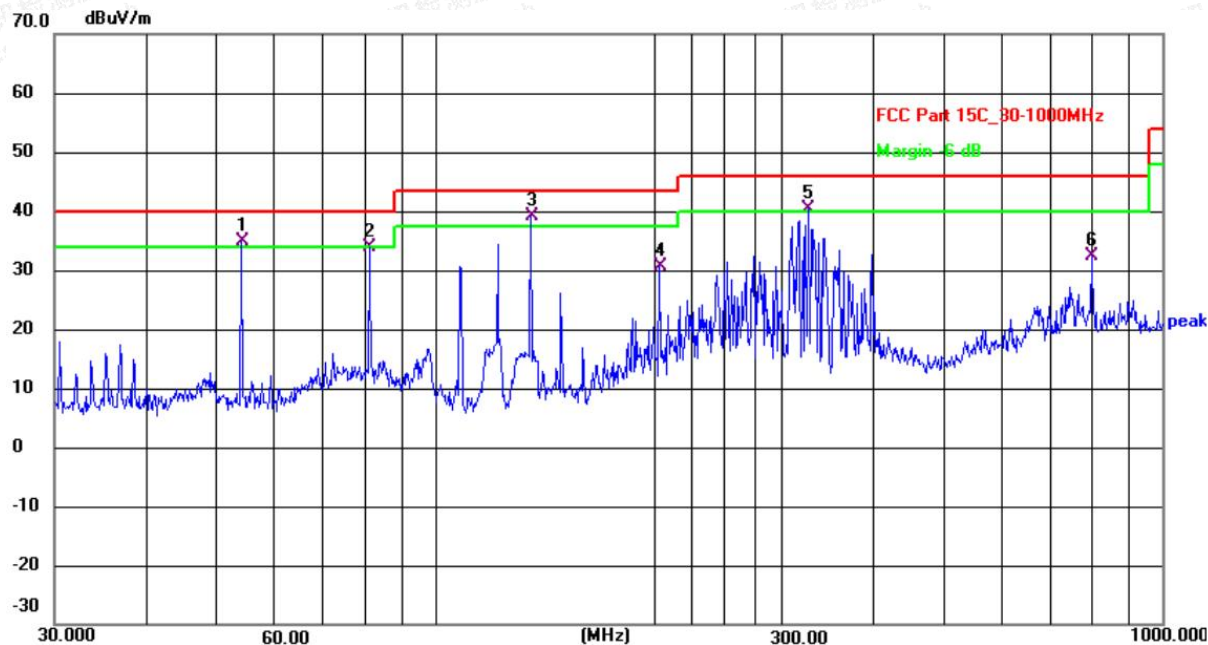
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



UART:

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	54.2610	52.63	-17.81	34.82	40.00	-5.18	QP
2	81.2117	53.74	-19.76	33.98	40.00	-6.02	QP
3	135.5062	59.83	-20.75	39.08	43.50	-4.42	QP
4	203.5228	48.03	-17.31	30.72	43.50	-12.78	QP
5	326.7395	54.72	-14.24	40.48	46.00	-5.52	QP
6	798.9797	42.28	-9.96	32.32	46.00	-13.68	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

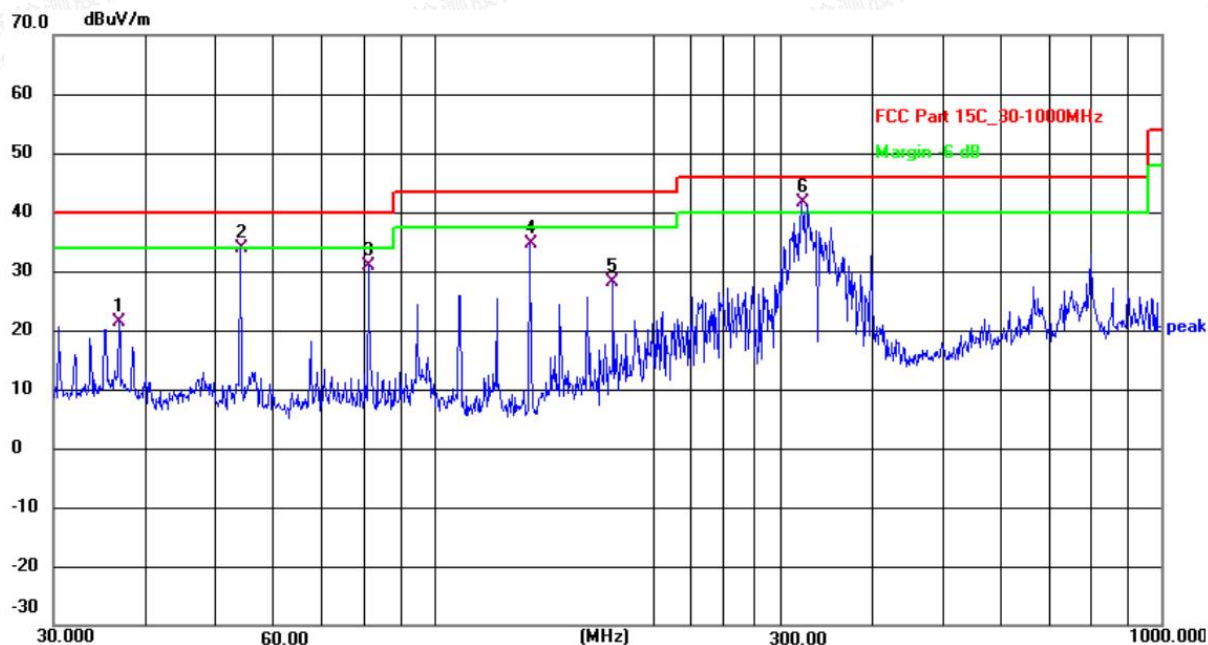
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8953	39.10	-17.69	21.41	40.00	-18.59	QP
2	54.2610	51.65	-17.81	33.84	40.00	-6.16	QP
3	81.2117	50.66	-19.76	30.90	40.00	-9.10	QP
4	135.5062	55.40	-20.75	34.65	43.50	-8.85	QP
5	176.2686	47.17	-19.00	28.17	43.50	-15.33	QP
6	319.9370	56.22	-14.48	41.74	46.00	-4.26	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

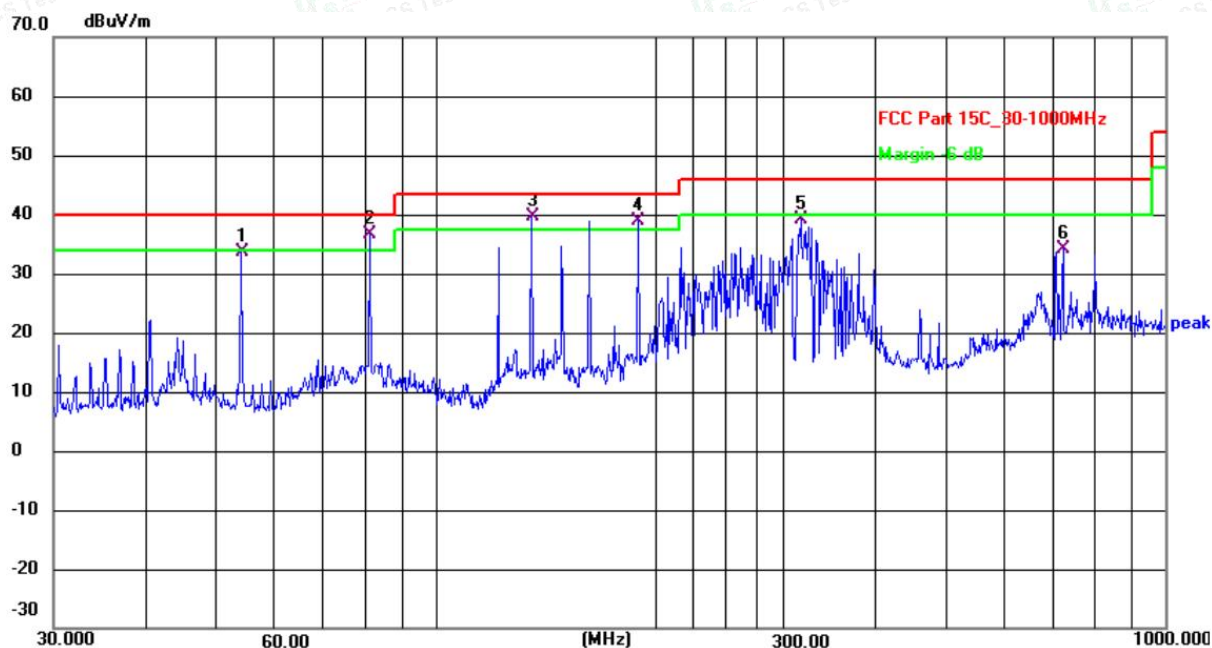
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



USB:

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	54.2610	51.54	-17.81	33.73	40.00	-6.27	QP
2	81.2117	56.36	-19.76	36.60	40.00	-3.40	QP
3	135.5062	60.34	-20.75	39.59	43.50	-3.91	QP
4	189.7385	56.32	-17.36	38.96	43.50	-4.54	QP
5	316.5890	53.67	-14.66	39.01	46.00	-6.99	QP
6	724.2611	44.66	-10.53	34.13	46.00	-11.87	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

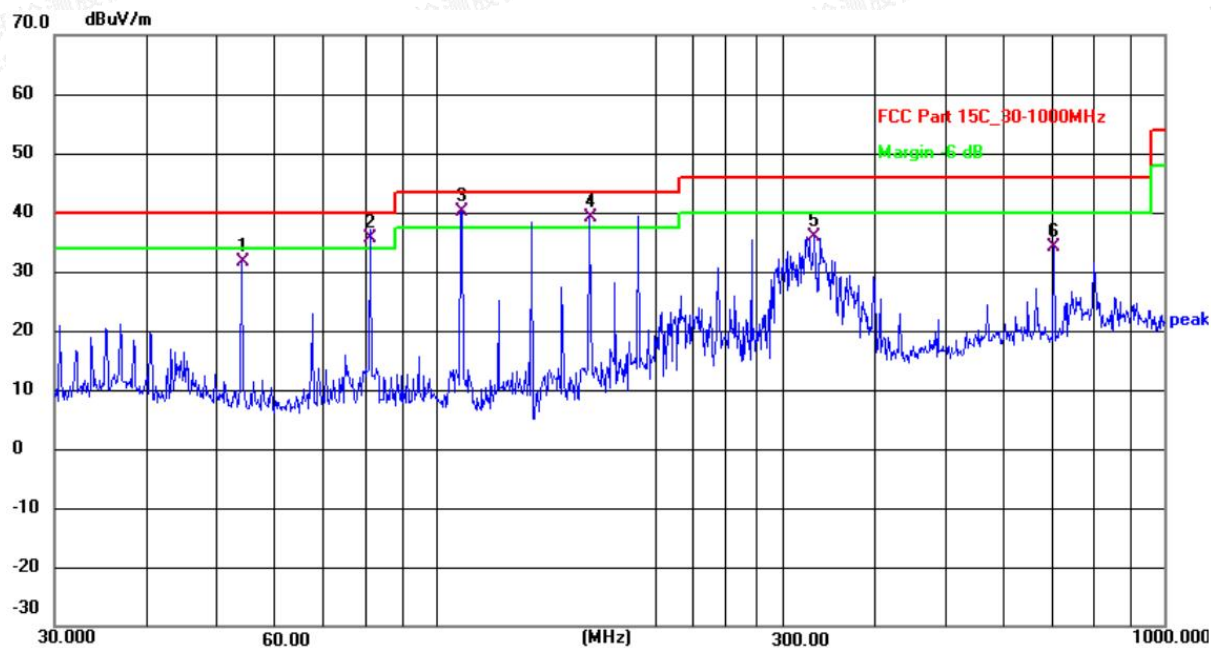
Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	54.2610	49.49	-17.81	31.68	40.00	-8.32	QP
2	81.2117	55.36	-19.76	35.60	40.00	-4.40	QP
3	108.2667	59.04	-18.90	40.14	43.50	-3.36	QP
4	162.6106	58.68	-19.63	39.05	43.50	-4.45	QP
5	331.3546	50.35	-14.36	35.99	46.00	-10.01	QP
6	704.2261	44.86	-10.85	34.01	46.00	-11.99	QP

Note:

Pre-scan all modes and recorded the worst case results in this report.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Factor + Read Level = Level.

Margin=Level – Limit.

All NFC antenna data have been evaluated, and only the worst mode data is included in the report(NFC ANT 1)



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

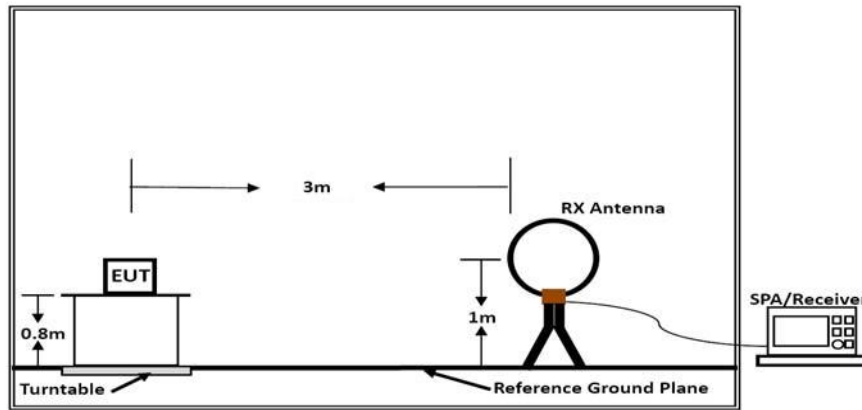
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

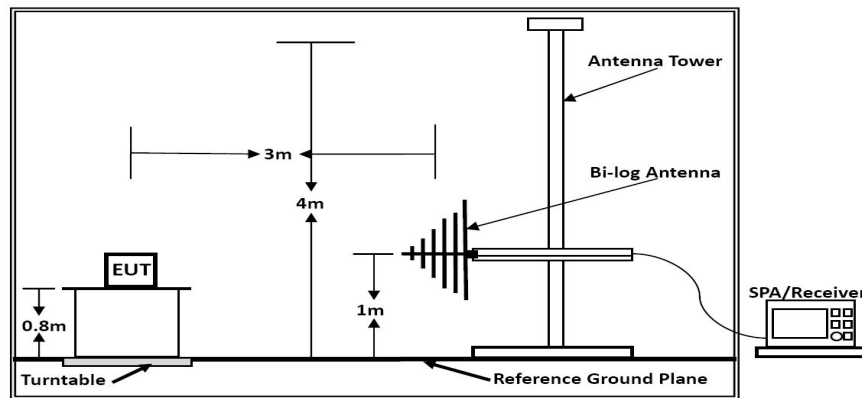


5.2. Field Strength of Fundamental Emissions and Mask Measurement

5.2.1. Block Diagram of Test Setup



Below 30MHz



Below 1GHz

5.2.2. Field strength of fundamental emissions limit and Mask limit

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (microvolts/meter)	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103.08 (QP)	124 (QP)

Mask Limit:

Frequency (MHz)	Limit (dBμV/m)	Distance (m)
1.705-13.110	69.5	3
13.110-13.410	80.5	3
13.410-13.553	90.5	3
13.553-13.567	124.0	3
13.567-13.710	90.5	3
13.710-14.010	80.5	3
14.010-30.000	69.5	3

5.2.3. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:





$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

5.2.4. Test Results

PASS.

The test data please refer to following page:

Temperature	23.7℃	Humidity	52.6%
Test Engineer	Paddi Chen	Configurations	NFC

ANT1

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	43.41	-10.01	33.40	124.00	-90.60	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

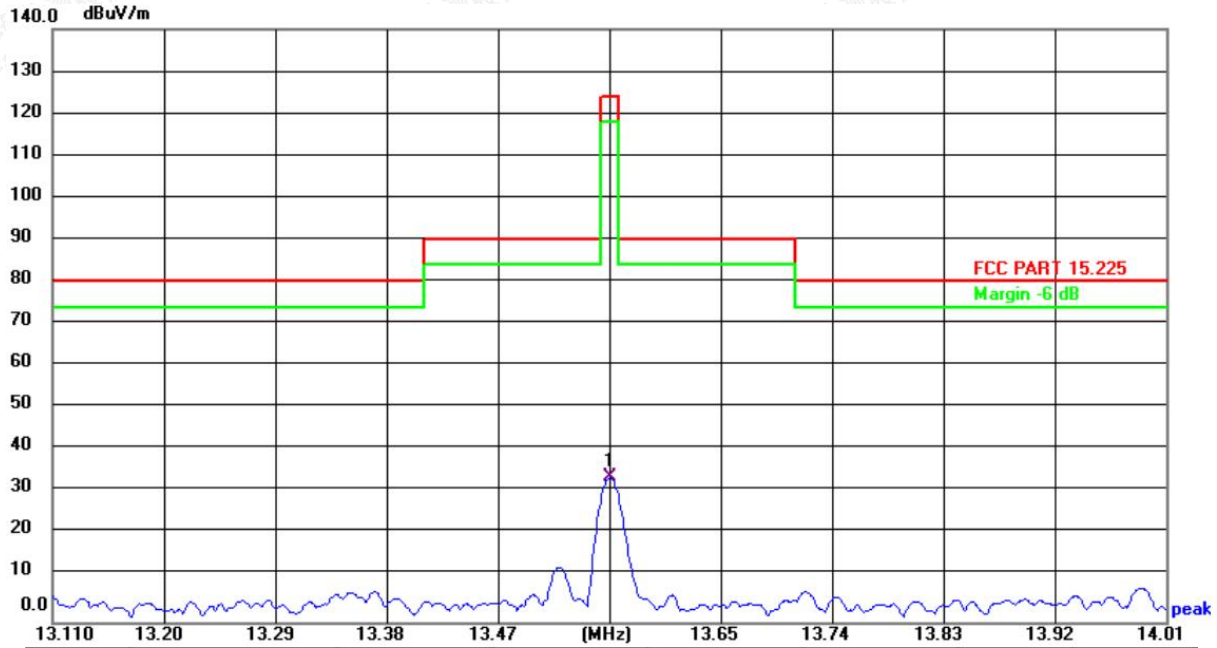
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT2

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	44.43	-10.01	34.42	124.00	-89.58	QP

ANT3

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	44.67	-10.01	34.66	124.00	-89.34	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

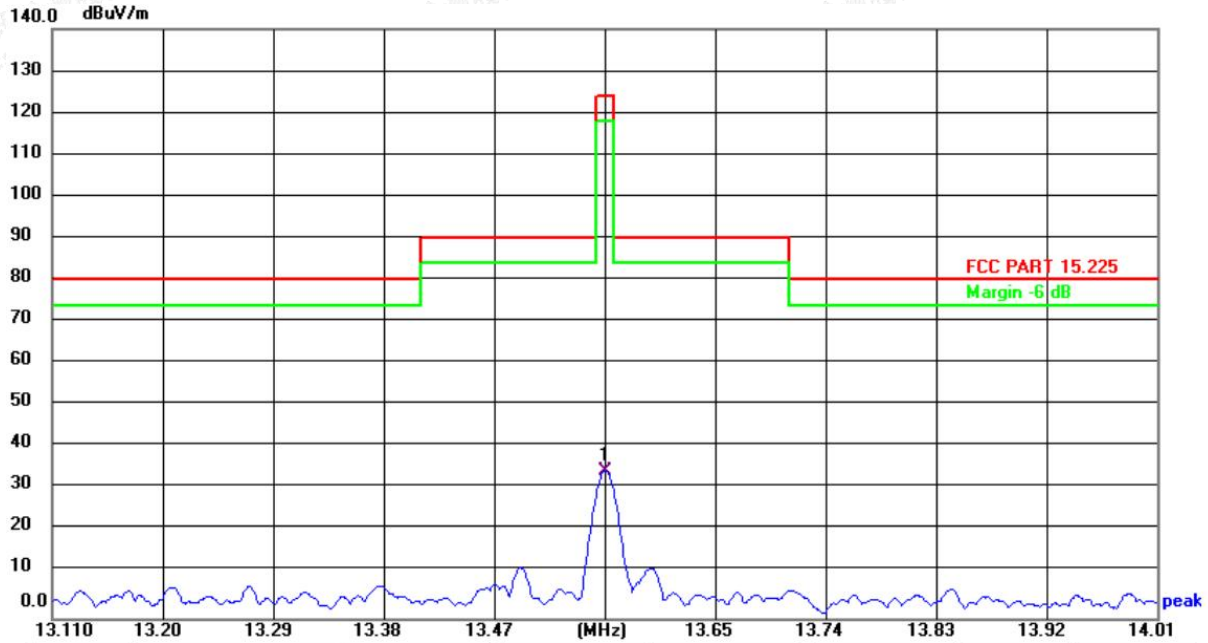
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT4

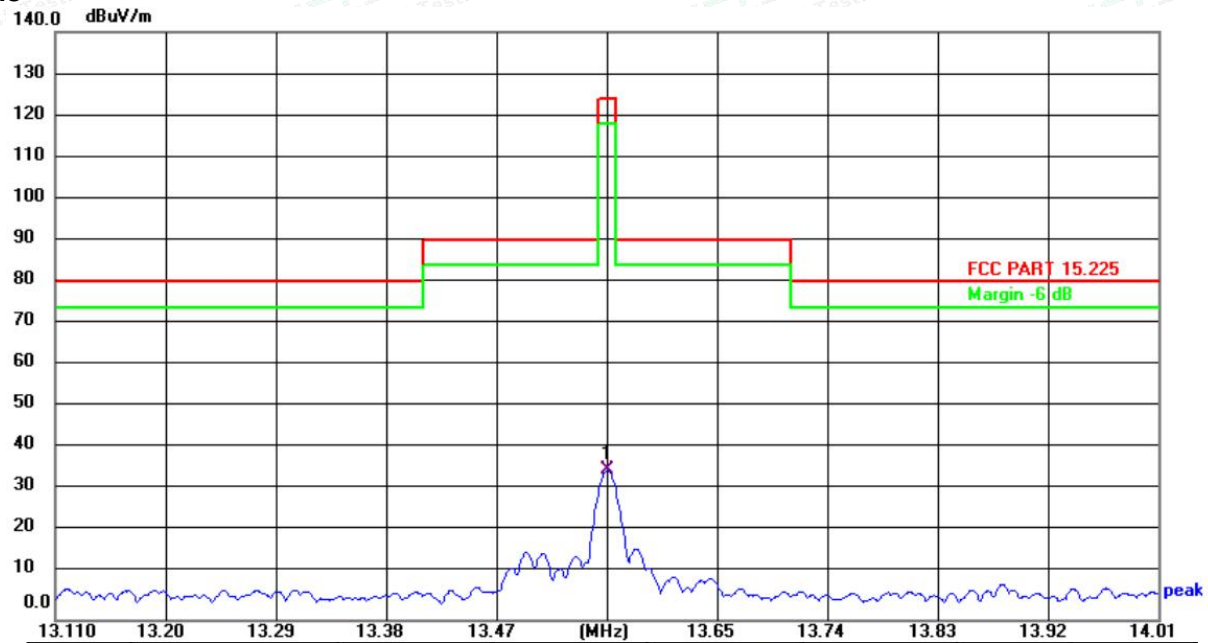
X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	45.31	-10.01	35.30	124.00	-88.70	QP

ANT5

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	45.83	-10.01	35.82	124.00	-88.18	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

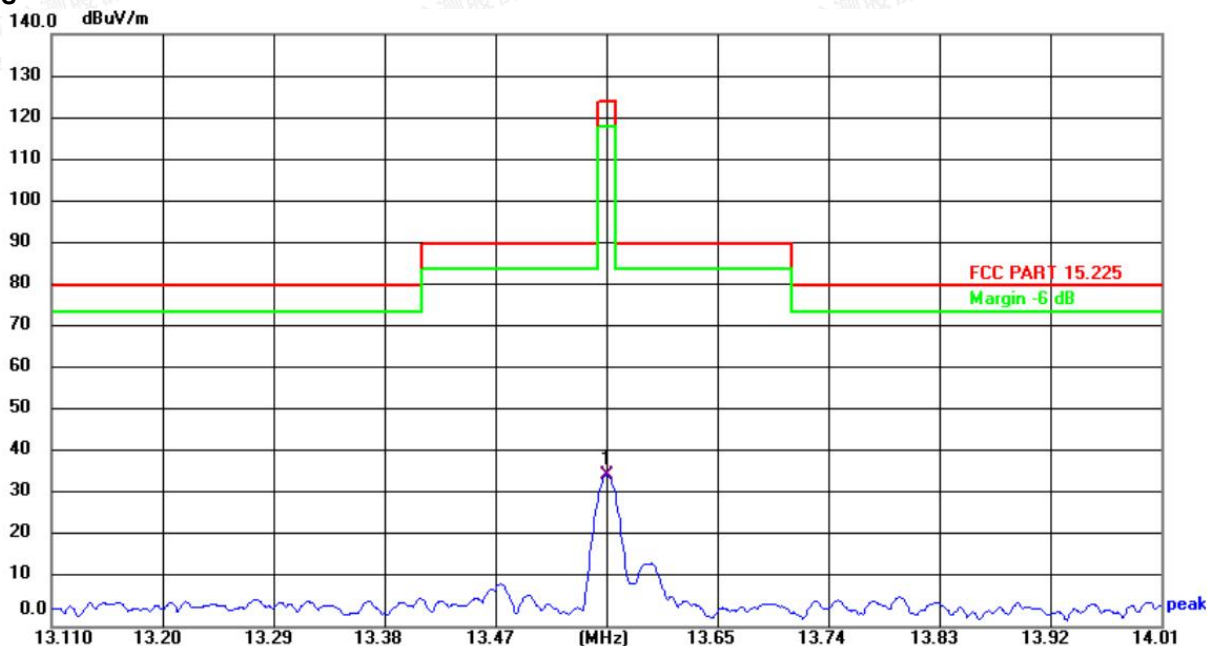
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT6

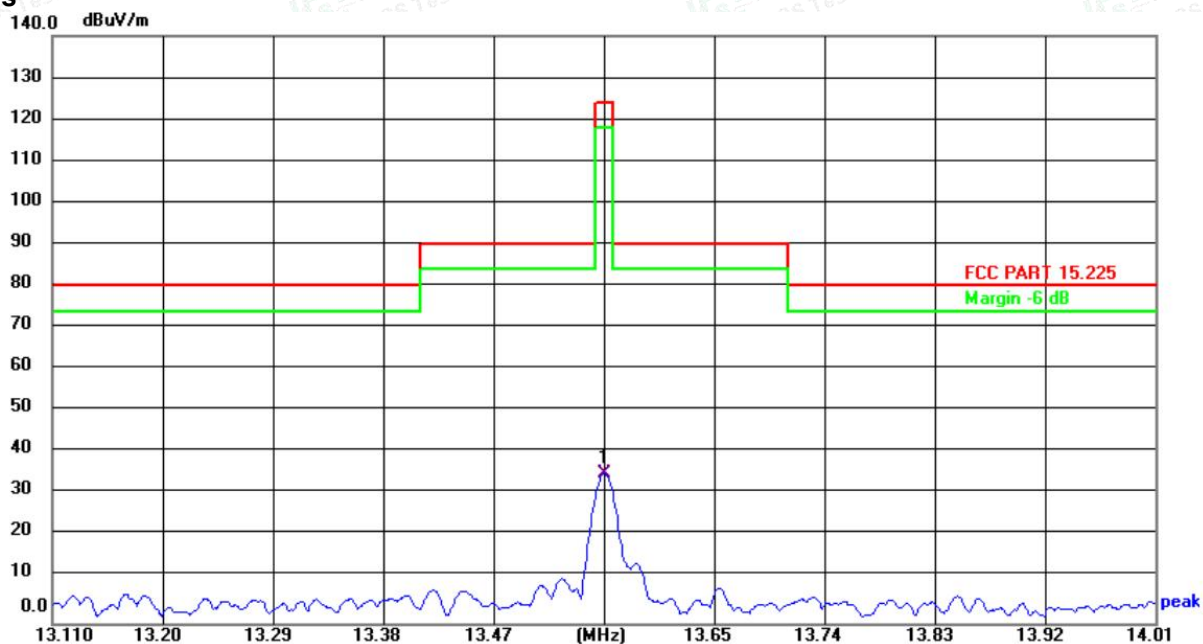
X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	45.89	-10.01	35.88	124.00	-88.12	QP

ANT7

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	45.94	-10.01	35.93	124.00	-88.07	QP



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

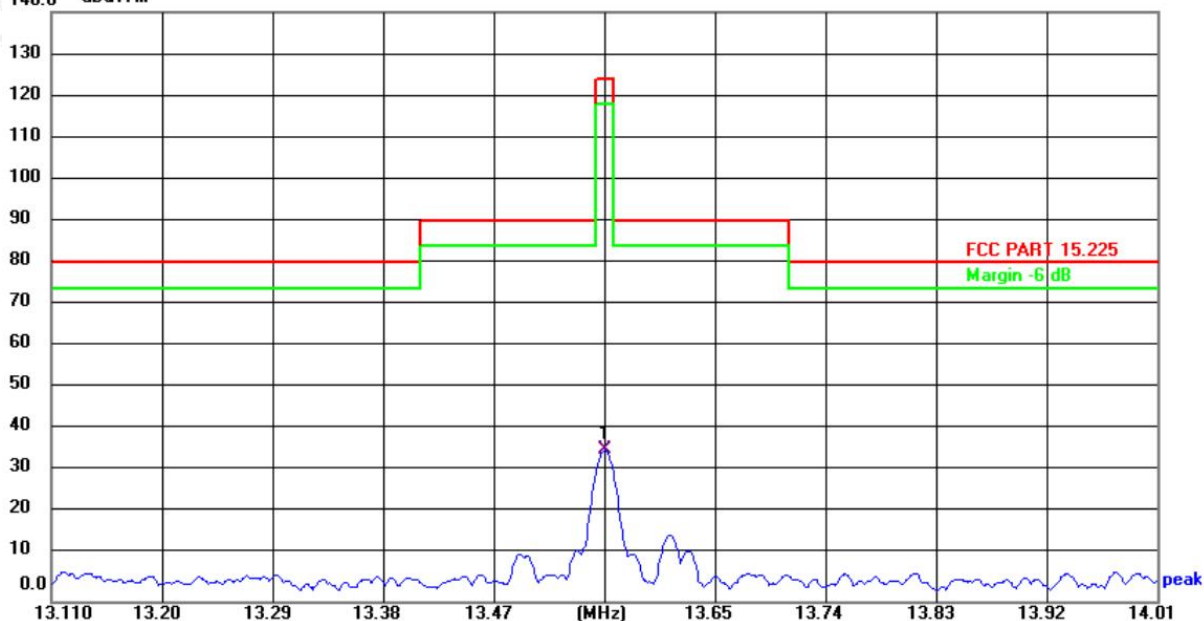
Scan code to check authenticity



ANT8

X axis

140.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	46.08	-10.01	36.07	124.00	-87.93	QP

*Note: Factor= Antenna Factor + Cable Loss

Measured (dBuV/m) = Reading + Factor, Margin= Measured - Limit

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Measured distance is 3m.

All emissions emit from non-NFC function of digital unintentional emissions. All NFC's spurious emissions are below 20dB of limits.

X axis / Y axis/ Z axis were tested,report only recorded the worst result of X axis.

All NFC antenna data have been evaluated, and only the worst mode data is included in the report(NFC ANT 1)



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



6. BANDWIDTH OF THE OPERATING FREQUENCY

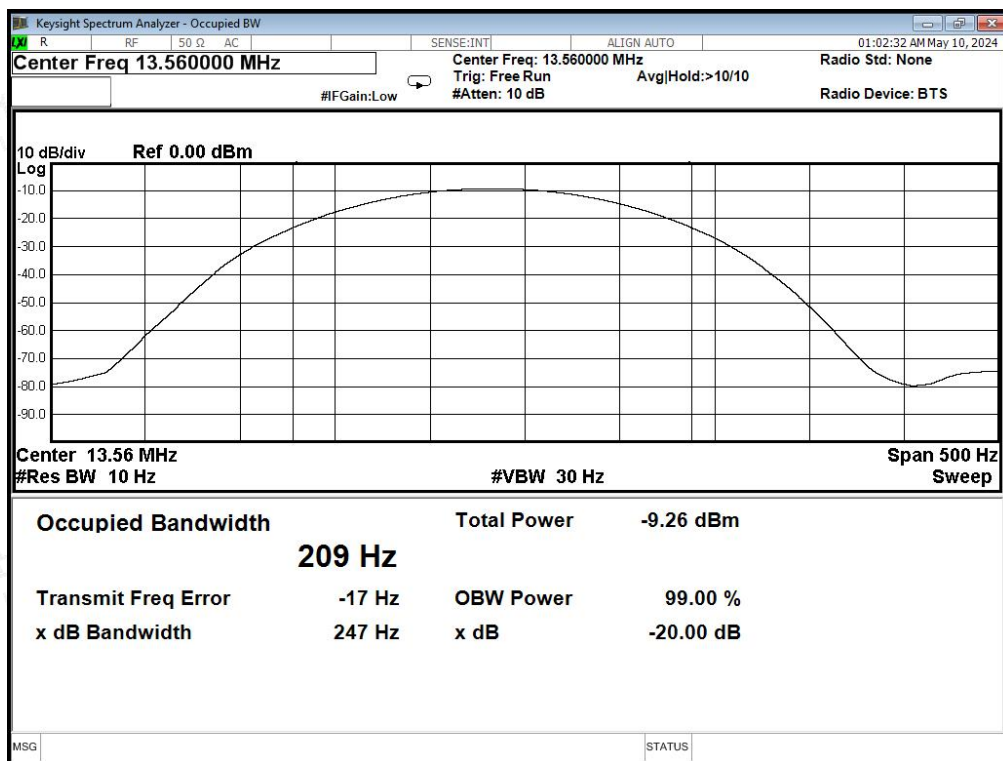
6.1. Standard Applicable

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 ~ 13.567MHz).

6.2. Test Result

ANT1	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.247

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

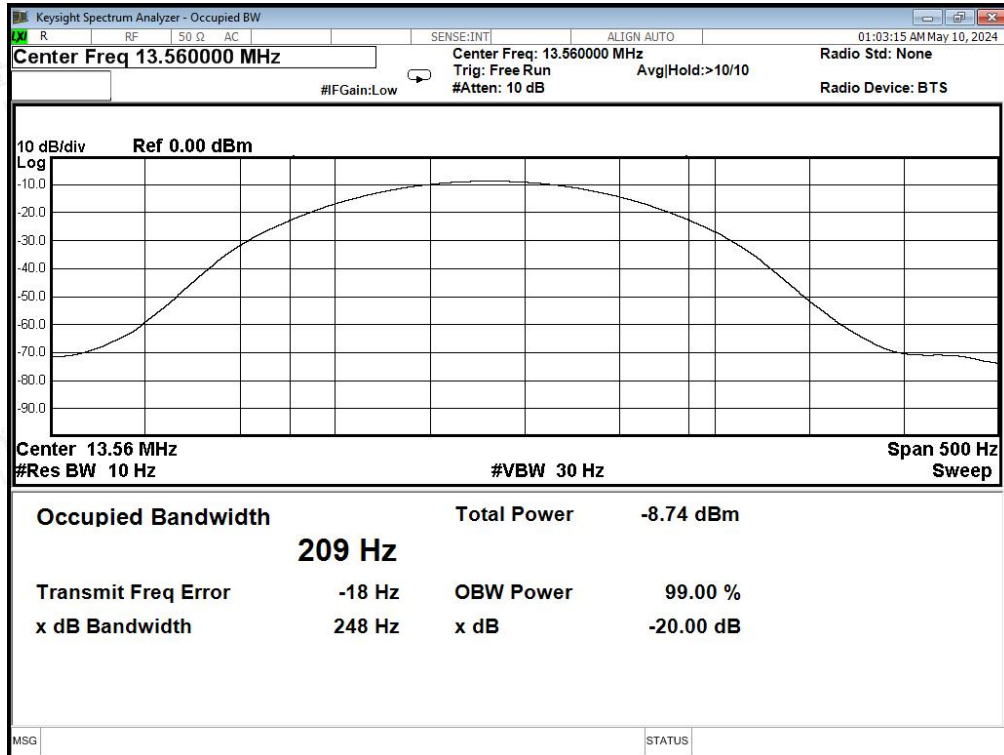
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT2	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

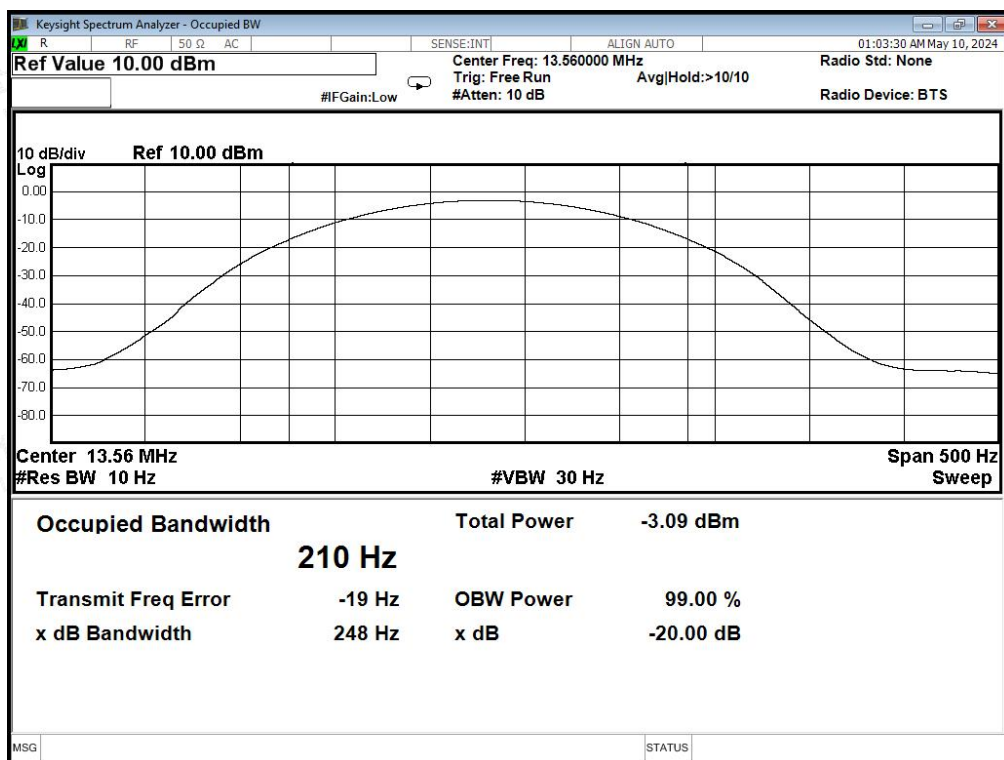
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT3	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

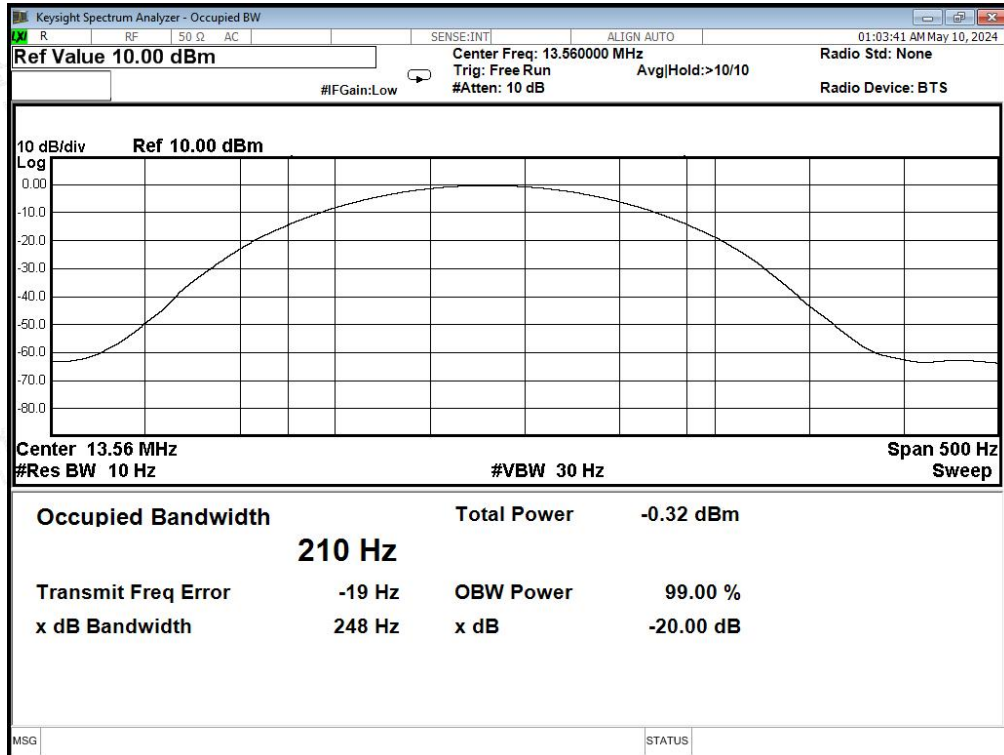
Please refer to the test plot:





ANT4	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

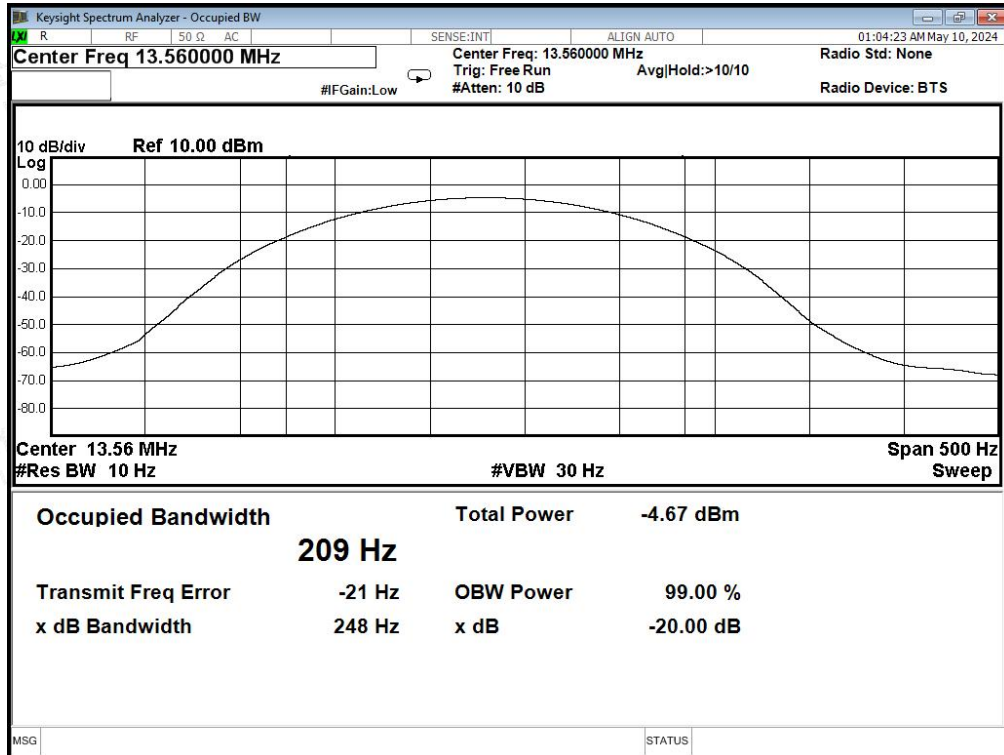
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT5	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

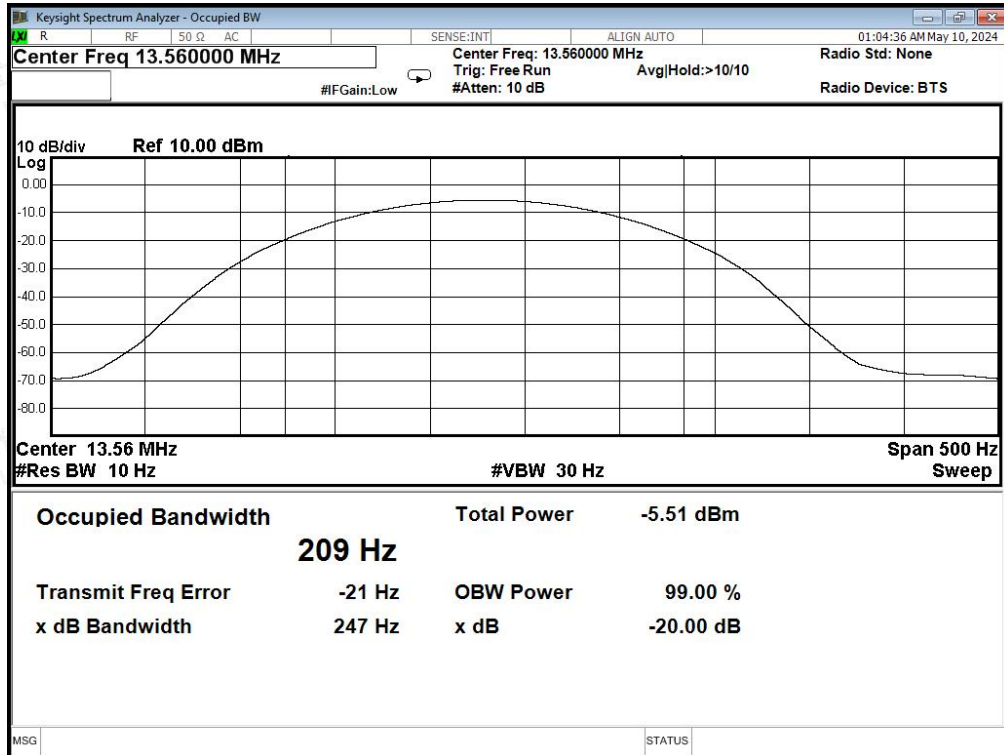
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT6	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.247

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

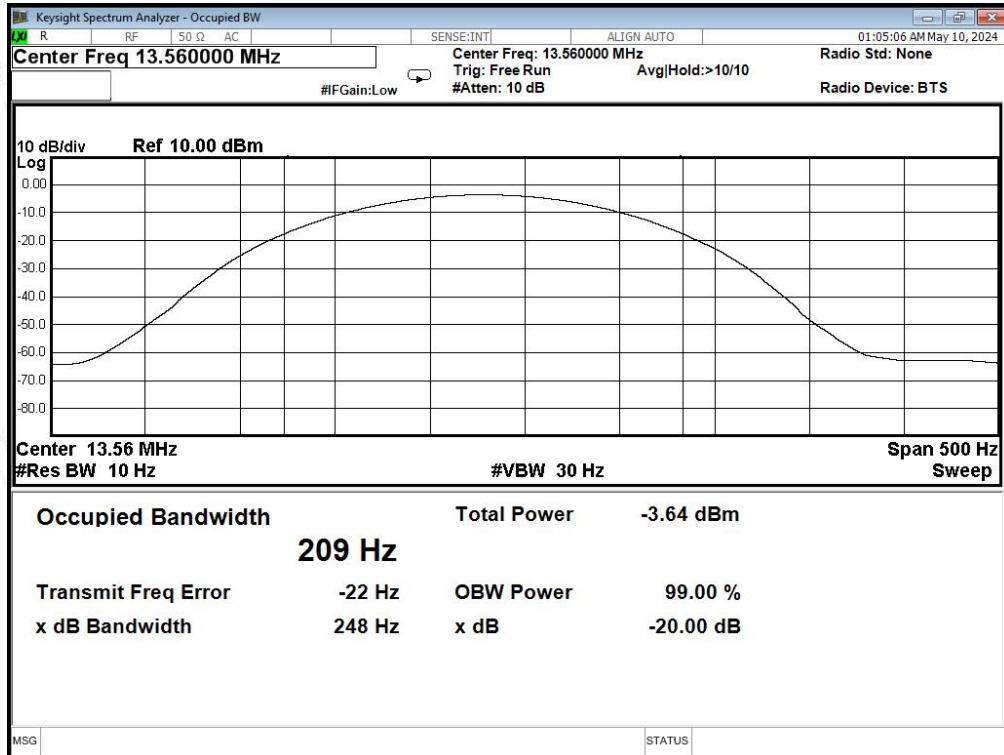
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT7	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

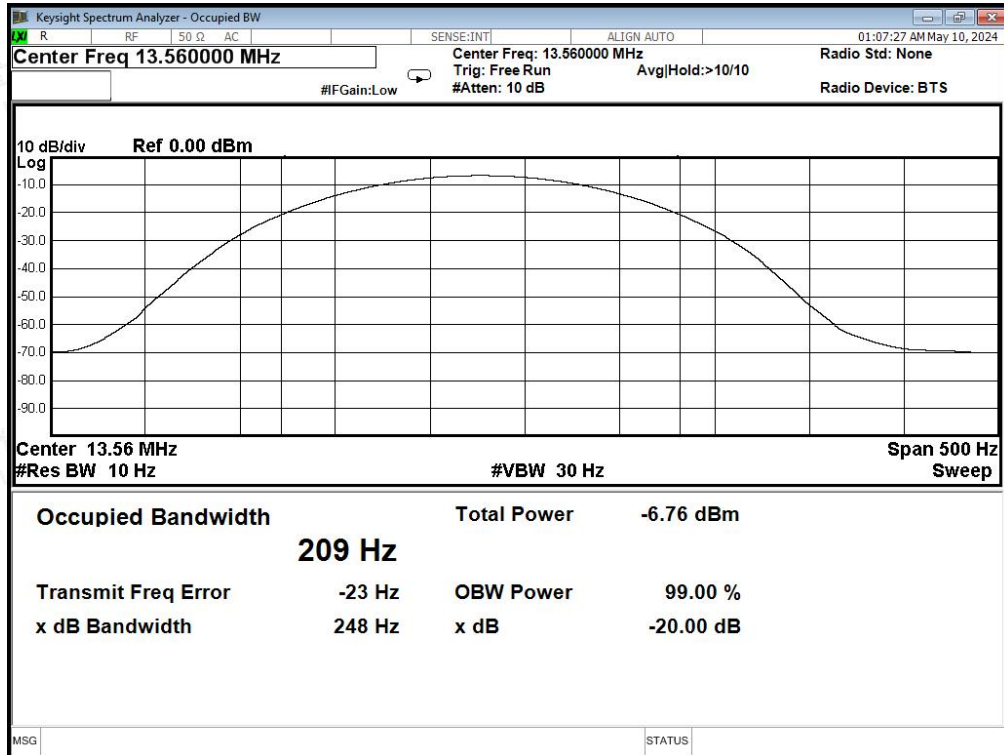
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



ANT8	
EUT	Pepper C1 MUX RFID Reader
RBW	10Hz
VBW	30Hz
SPAN	500Hz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	0.248

Please refer to the test plot:



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



7. FREQUENCY STABILITY MEASUREMENT

7.1 Standard Applicable

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ (100ppm) 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 full charged battery.

7.2 Test Result

ANT1

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56045	0.45	32.90	100
VN	13.56043	0.43	31.78	100
VH	13.56032	0.32	23.81	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56024	0.24	17.91	100
-10	13.56025	0.25	18.29	100
0	13.56027	0.27	19.94	100
10	13.56029	0.29	21.64	100
20	13.56046	0.46	33.64	100
30	13.56038	0.38	28.19	100
40	13.56034	0.34	24.86	100
50	13.56025	0.25	18.59	100

ANT2

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56040	0.40	29.66	100
VN	13.56042	0.42	30.77	100
VH	13.56028	0.28	20.56	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56030	0.30	21.87	100
-10	13.56025	0.25	18.55	100
0	13.56029	0.29	21.04	100
10	13.56039	0.39	29.03	100
20	13.56034	0.34	25.03	100
30	13.56035	0.35	25.84	100
40	13.56042	0.42	30.61	100
50	13.56029	0.29	21.15	100





ANT3

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56042	0.42	31.03	100
VN	13.56031	0.31	23.16	100
VH	13.56024	0.24	18.00	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56030	0.30	22.45	100
-10	13.56030	0.30	22.06	100
0	13.56028	0.28	20.39	100
10	13.56039	0.39	28.66	100
20	13.56039	0.39	28.54	100
30	13.56029	0.29	21.69	100
40	13.56031	0.31	22.96	100
50	13.56034	0.34	24.90	100

ANT4

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56041	0.41	30.38	100
VN	13.56035	0.35	25.58	100
VH	13.56031	0.31	22.81	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56029	0.29	21.52	100
-10	13.56026	0.26	19.04	100
0	13.56032	0.32	23.95	100
10	13.56040	0.40	29.40	100
20	13.56044	0.44	32.37	100
30	13.56038	0.38	27.89	100
40	13.56044	0.44	32.18	100
50	13.56028	0.28	20.82	100





ANT5

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56047	0.47	34.44	100
VN	13.56042	0.42	31.16	100
VH	13.56031	0.31	23.04	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56037	0.37	27.27	100
-10	13.56023	0.23	17.10	100
0	13.56028	0.28	20.72	100
10	13.56043	0.43	31.66	100
20	13.56041	0.41	29.94	100
30	13.56039	0.39	28.47	100
40	13.56044	0.44	32.58	100
50	13.56039	0.39	28.74	100

ANT6

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56047	0.47	34.54	100
VN	13.56032	0.32	23.88	100
VH	13.56036	0.36	26.58	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56025	0.25	18.58	100
-10	13.56028	0.28	20.70	100
0	13.56023	0.23	16.75	100
10	13.56038	0.38	28.09	100
20	13.56038	0.38	27.66	100
30	13.56039	0.39	28.70	100
40	13.56032	0.32	23.42	100
50	13.56035	0.35	26.12	100





ANT7

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56039	0.39	28.99	100
VN	13.56031	0.31	22.64	100
VH	13.56036	0.36	26.76	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56036	0.36	26.28	100
-10	13.56023	0.23	16.67	100
0	13.56024	0.24	18.06	100
10	13.56043	0.43	31.45	100
20	13.56033	0.33	24.53	100
30	13.56029	0.29	21.54	100
40	13.56035	0.35	25.91	100
50	13.56030	0.30	22.48	100

ANT8

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VL	13.56046	0.46	34.07	100
VN	13.56029	0.29	21.51	100
VH	13.56023	0.23	16.97	100

Temperature vs. Frequency Stability

Temperature (°C)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56036	0.36	26.56	100
-10	13.56030	0.30	22.32	100
0	13.56029	0.29	21.66	100
10	13.56039	0.39	28.67	100
20	13.56038	0.38	28.12	100
30	13.56037	0.37	27.36	100
40	13.56041	0.41	30.55	100
50	13.56032	0.32	23.95	100



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



8. LINE CONDUCTED EMISSIONS

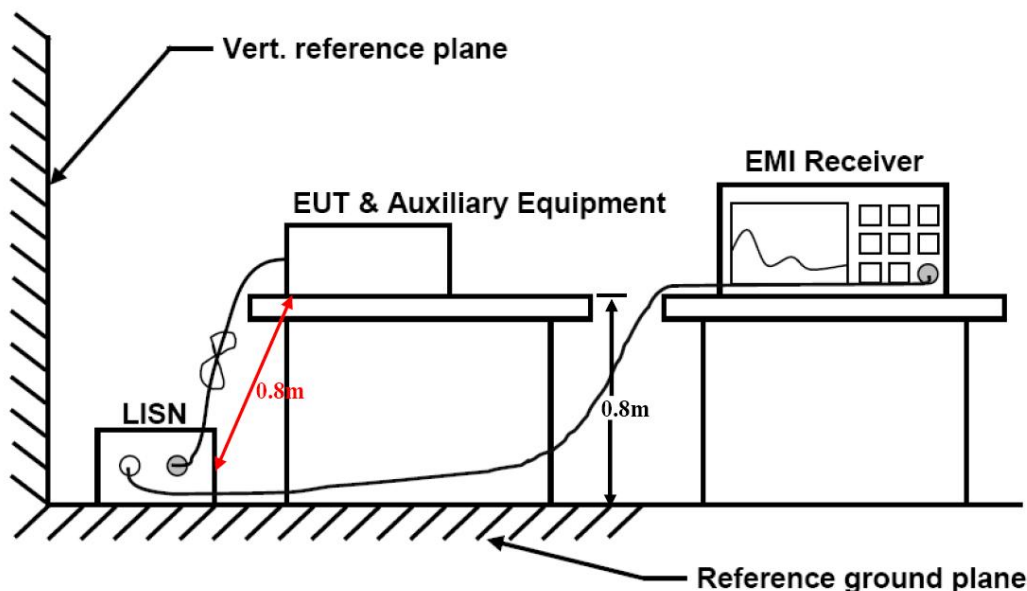
8.1. Standard Applicable

According to §15.207(a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

8.2. Block Diagram of Test Setup



8.3 Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$CD \text{ (dB}\mu\text{V)} = RA \text{ (dB}\mu\text{V)} + PL \text{ (dB)} + CL \text{ (dB)}$$

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

8.4. Test Results

Not applicable.





9. ANTENNA REQUIREMENTS

9.1 Standard Applicable

According to antenna requirement of §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

9.2 Antenna Connected Construction

9.2.1. Standard Applicable

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.

9.2.2. Antenna Connector Construction

The gains of antenna used for transmitting is 0dBi, and the antenna is PCB Track Loop Antennas connect to PCB board and no consideration of replacement. Please see EUT photo for details.

9.2.3. Results: Compliance.



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



10. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2023-06-09	2024-06-08
2	Power Sensor	R&S	NRV-Z81	100458	2023-06-09	2024-06-08
3	Power Sensor	R&S	NRV-Z32	10057	2023-06-09	2024-06-08
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2023-08-15	2024-08-14
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2023-10-18	2024-10-17
7	DC Power Supply	Agilent	E3642A	N/A	2023-10-18	2024-10-17
8	EMI Test Software	AUDIX	E3	/	N/A	N/A
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2023-06-09	2024-06-08
10	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2021-08-29	2024-08-28
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2021-08-29	2024-08-28
15	Broadband Preamplifier	SCHWARZBECK	BBV9719	9719-025	2021-08-29	2024-08-28
16	EMI Test Receiver	R&S	ESR 7	101181	2023-08-15	2024-08-14
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2023-07-17	2024-07-16
18	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2023-10-18	2024-10-17
19	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2023-10-18	2024-10-17
20	6dB Attenuator	/	100W/6dB	1172040	2023-06-09	2024-06-08
21	3dB Attenuator	/	2N-3dB	/	2023-10-18	2024-10-17
22	EMI Test Receiver	R&S	ESPI	101940	2023-08-15	2024-08-14
23	Artificial Mains	R&S	ENV216	101288	2023-06-09	2024-06-08
24	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2023-06-09	2024-06-08
25	EMI Test Software	Farad	EZ	/	N/A	N/A
26	Antenna Mast	Max-Full	MFA-515BSN	1308572	N/A	N/A
27	Pulse Limiter	R&S	ESH3-Z2	102750-NB	2023-08-15	2024-08-14



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



11. Test Setup Photographs of Eut

Please refer to separated files for Test Setup Photos of the EUT.

12. Exterior Photographs of the Eut

Please refer to separated files for Exterior Photos of the EUT.

13. Interior Photographs of the Eut

Please refer to separated files for Interior Photos of the EUT.

-----THE END OF REPORT-----



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity