

# FCC RF TEST REPORT

ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**MIFARE MODULE**

ISSUED TO  
Beijing StrongLink Technology Co., Ltd.

Building C No.39 Xi'erqi street Haidian district Beijing 100085 China



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Date: Jan. 18, 2019

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(Chief Engineer)

Date: Jan. 18, 2019

Report No.: BL-SZ18B0388-601  
EUT Name: MIFARE MODULE  
Model Name: SL030 V3.1-120P  
Brand Name: N/A  
Test Standard: 47 CFR Part 15 Subpart C  
FCC ID: 2ADI8-SL30120P

Test Conclusion: Pass  
Test Date: Dec. 03, 2018 ~ Jan. 18, 2019  
Date of Issue: Jan. 18, 2019

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### Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Dec. 25, 2018</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Jan. 18, 2019</u>	<u>Host for the whole test, Update all data and photos</u>

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## 1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

### 1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

### 1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	<p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.</p> <p>The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025.The accreditation certificate is 4344.01.</p> <p>The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.</p>
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

### 1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

### 1.4 Announce

- (1) The test report reference to the report template version v6.2.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

Applicant	Beijing StrongLink Technology Co., Ltd.
Address	Building C No.39 Xi'erqi street Haidian district Beijing 100085 China

### 2.2 Manufacturer Information

Manufacturer	Beijing StrongLink Technology Co., Ltd.
Address	Building C No.39 Xi'erqi street Haidian district Beijing 100085 China

### 2.3 Factory Information

Factory	Beijing StrongLink Technology Co., Ltd.
Address	Building C No.39 Xi'erqi street Haidian district Beijing 100085 China

### 2.4 General Description for Equipment under Test (EUT)

EUT Name	MIFARE MODULE
Under Test Model Name	SL030 V3.1-120P
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	SL030 V3.1-120P
Software Version	SL030_3.1_20180509
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

### 2.5 Ancillary Equipment

Note: Not applicable.

### 2.6 Technical Information

Network and Wireless connectivity	NFC
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The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Product Type	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Frequency Range	13.56 MHz
Receiver Categorization	3
Number of channel	1
Tested Channel	1
Antenna Type	PCB Antenna

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (10-1-17 Edition)	Miscellaneous Wireless Communications Services
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

#### 3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	Pass <sup>Note 1</sup>
2	Emissions Bandwidth	15.215	ANNEX A.1	Pass
3	Field Strength of Fundamental Emissions	15.225(a)	ANNEX A.2	Pass
4	Radiated Emissions	15.225(d) 15.209	ANNEX A.3	Pass
5	Frequency Stability	15.225(e)	ANNEX A.4	Pass
6	Conducted Emission	15.207	ANNEX A.5	N/A <sup>Note 2</sup>

Note 1: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203 & RSS-Gen 8.3.

Note 2: The EUT only powered by DC Power Supply, so the Conducted Emission test is not applicable.

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
Working Voltage of the EUT	NV (Normal Voltage)	3.3 V

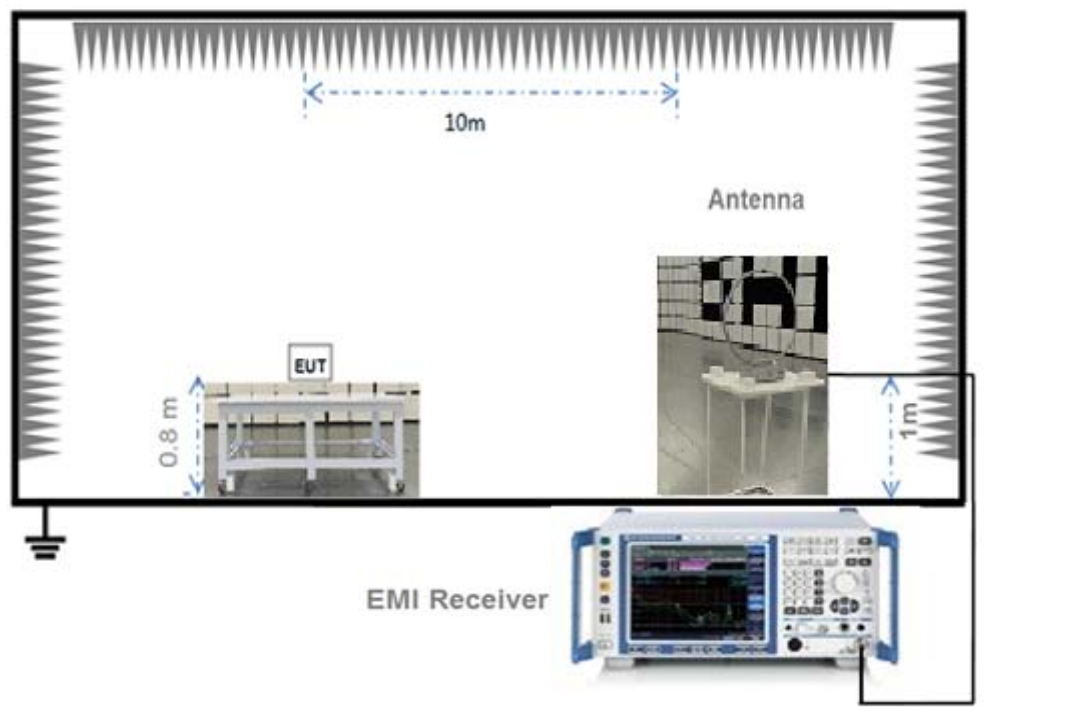
### 4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2018.06.11	2019.06.10
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	260592	2018.06.11	2019.06.10
Signal Generator	ROHDE&SCHWARZ	SMB100A	177746	2018.06.11	2019.06.10
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2018.06.11	2019.06.10
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2018.11.06	2019.11.05
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2018.06.13	2019.06.12
LISN	SCHWARZBECK	NSLK 8127	8127-687	2018.06.13	2019.06.12
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2018.06.11	2019.06.10
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2018.06.11	2019.06.10
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2018.06.21	2019.06.20
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2018.06.26	2019.06.25
Test Antenna-Rod(9 kHz-30 MHz)	SCHWARZBECK	VAMP 9243	9243-556	2017.11.07	2019.11.08
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2017.07.22	2019.07.21
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2018.07.11	2019.07.10
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2018.06.21	2019.06.20
Test Antenna-Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2018.06.21	2019.06.20
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6m*7.35m	N/A	2017.02.21	2019.02.20
Shielded Enclosure	ChangNing	CN-130701	130703	--	--
Test Software	BALUN	BL410_E	V18.626	--	--

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Amplifier	COM-MW	KL_LNA_18-4 0G-01	N/A	2018.06.26	2019.06.25
RF Cable 1	ROHDE&SCHWARZ	JUNFLON	APR0914004	2018.07.10	2019.10.09
RF Cable 2	Huber&suhner	RG_400_/U	N/A	2018.07.10	2019.10.09
RF Cable 3	Huber&suhner	RG_400_/U	N/A	2018.07.10	2019.10.09
RF Cable 4	Huber&suhner	SX_04172_B- 60	N/A	2018.07.10	2019.10.09
RF Cable 5	COM-MW	RFJA360-2.9 2mm-J/J3M	N/A	2018.07.10	2019.10.09
Note: The calibration period on the Cable is three month.					

### 4.3 Description of Test Setup

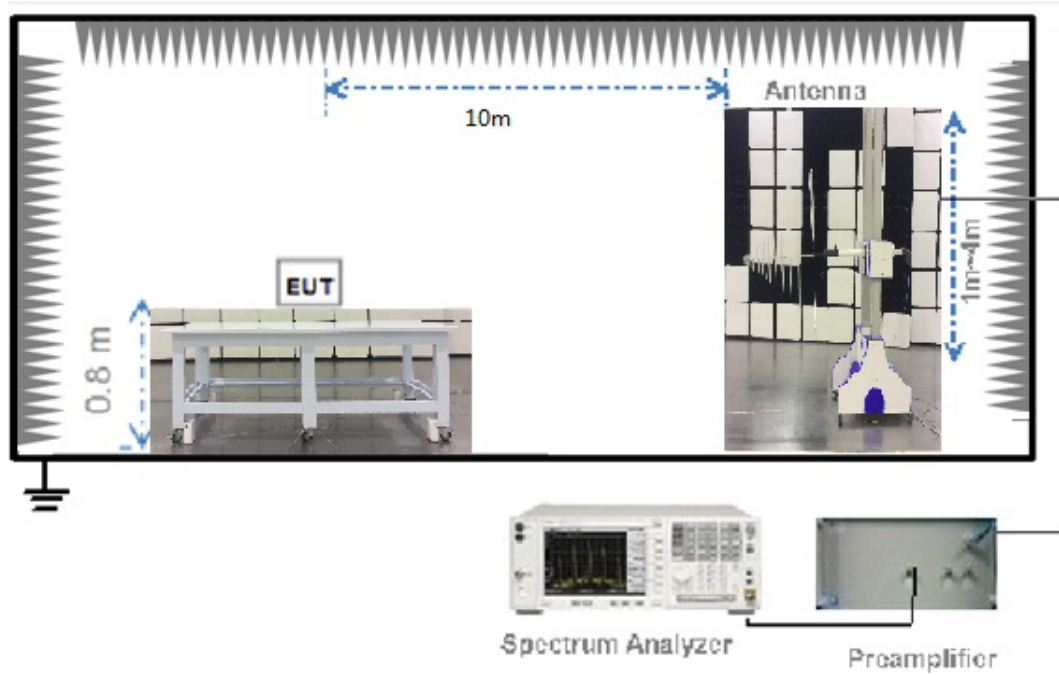
#### 4.3.1 For Radiated Test (Below 30 MHz)



(Diagram 1)

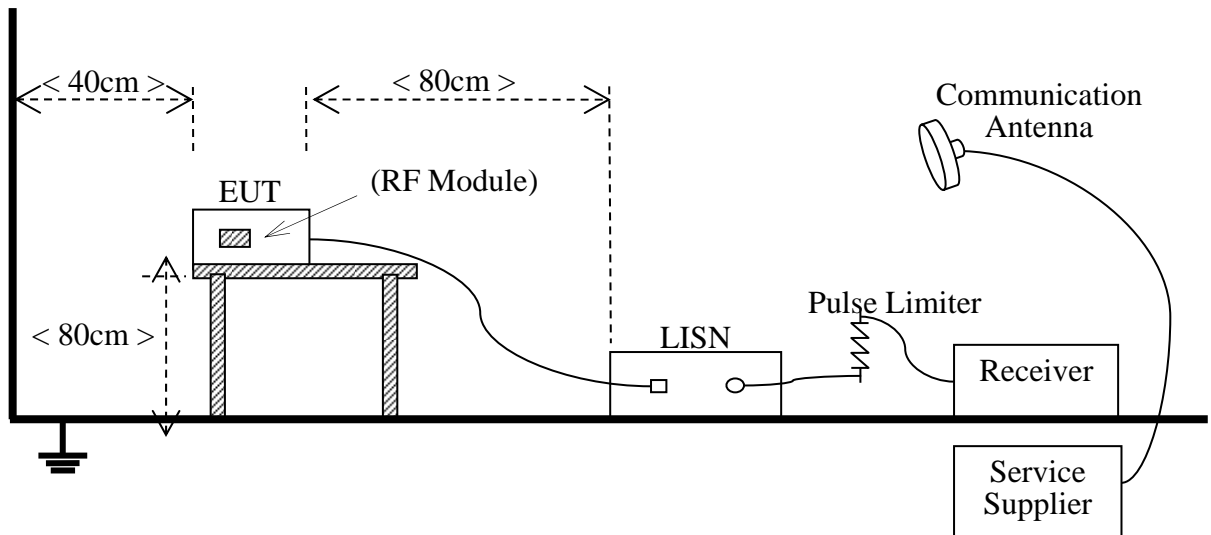


#### 4.3.2 For Radiated Test (30 MHz-1 GHz)



(Diagram 2)

#### 4.3.3 For AC Power Supply Port Test



(Diagram 3)

## 5 TEST ITEMS

### 5.1 Antenna Requirements

#### 5.1.1 Relevant Standards

##### FCC §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 replaced 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 § 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 § 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.

##### RSS-Gen 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISSED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.



## 5.2 Emission Bandwidth

### 5.2.1 Definition

15.215(c);

Intentional radiators operating under the alternative provisions to the general emission limits must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

RSS-Gen 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample” . However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold” ) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

### 5.2.2 Test Setup

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

### 5.2.3 Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while the EUT is operating in transmission mode.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth

RBW  $\geq$  1% of the 20 dB bandwidth & RBW = 1% to 5% OBW

VBW  $\geq$  RBW & VBW = 3\* RBW

Sweep = auto

Detector function = peak

Trace = max hold

### 5.2.4 Test Result

Please refer to ANNEX A.1



### 5.3 Field Strength of Fundamental Emissions and Radiated Emissions

#### 5.3.1 Limit

FCC §15.225(a), (b), (c); RSS-210 B.6

According to FCC section 15.225, for <30 MHz, Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 10 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 KHz. (Note: During testing the receive antenna was rotated about its axis to maximize the emission from the EUT)

There was no detected Restricted bands and Radiated suprious emission below 30MHz. The 30m limit was converted to 3m Limit using square factor(x) as it was found by measurements as follows; 3 m Limit(dBuV/m) =  $20\log(X)+40\log(30/3)= 20\log(15848)+40\log(30/3) = 124\text{dBuV}$

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency range (MHz)	Field Strength@30m		Field Strength@10m	Field Strength@3m
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
Below 13.110	30	29.5	48.58	69.5
13.110 ~ 13.410	106	40.5	59.58	80.5
13.410 ~ 13.553	334	50.5	69.58	90.5
13.553 ~13.567	15848	84	103.08	124
13.567 ~ 13.710	334	50.5	69.58	90.5
13.710 ~14.010	106	40.5	59.58	80.5
Above 14.010	30	29.5	48.58	69.5

NOTE:

1. Field Strength ( $\text{dB}\mu\text{V/m}$ ) =  $20*\log[\text{Field Strength } (\mu\text{V/m})]$ .
2. In the emission tables above, the tighter limit applies at the band edges.

FCC §15.225(d)

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )
0.009 - 0.490	$2400/\text{F(kHz)}$
0.490 - 1.705	$24000/\text{F(kHz)}$
1.705 - 30.0	30
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Note:

1. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

### 5.3.2 Test Setup

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

### 5.3.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

### 5.3.4 Test Result

Please refer to ANNEX A.2

NOTE:

1. Results (dBuV/m) = Reading (dBuV) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

## 5.4 Frequency Tolerance

### 5.4.1 Limit

FCC §15.225(e)

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.

RSS-210 B.6

(a) at the temperatures of  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ),  $+20^{\circ}\text{C}$  ( $+68^{\circ}\text{F}$ ) and  $+50^{\circ}\text{C}$  ( $+122^{\circ}\text{F}$ ), and at the manufacturer's rated supply voltage; and

(b) at the temperature of  $+20^{\circ}\text{C}$  ( $+68^{\circ}\text{F}$ ) and at  $\pm 15\%$  of the manufacturer's rated supply voltage.

If the frequency stability limits are only met within a temperature range that is smaller than the  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  range specified in (a), the frequency stability requirement will be deemed to be met if the transmitter is automatically prevented from operating outside this smaller temperature range and if the published operating characteristics for the equipment are revised to reflect this restricted temperature range.

### 5.4.2 Test Setup

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

### 5.4.3 Test Procedure

1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + DC Power Supply.

### 5.4.4 Test Result

Please refer to ANNEX A.4.

## 5.5 Conducted Emission

### 5.5.1 Limit

FCC §15.207; RSS-Gen

For an intentional radiator that 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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

### 5.5.2 Test Setup

See section 4.1.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

### 5.5.3 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

### 5.5.4 Test Result

Please refer to ANNEX A.5.

NOTE:

1. Results (dB $\mu$ V/m) = Reading (dB $\mu$ V) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor = Insertion loss + Cable loss

3. Over limit = Results – Limit.

## ANNEX A TEST RESULT

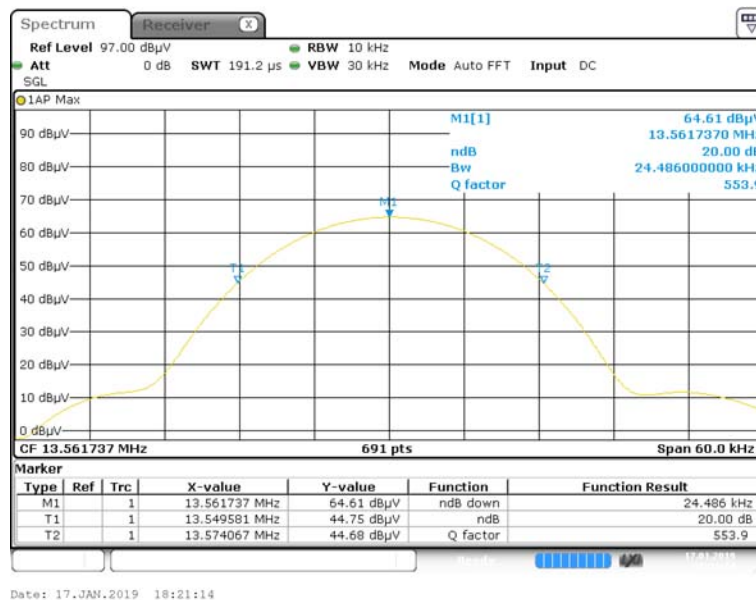
### A.1 Emission Bandwidth

#### Test Data

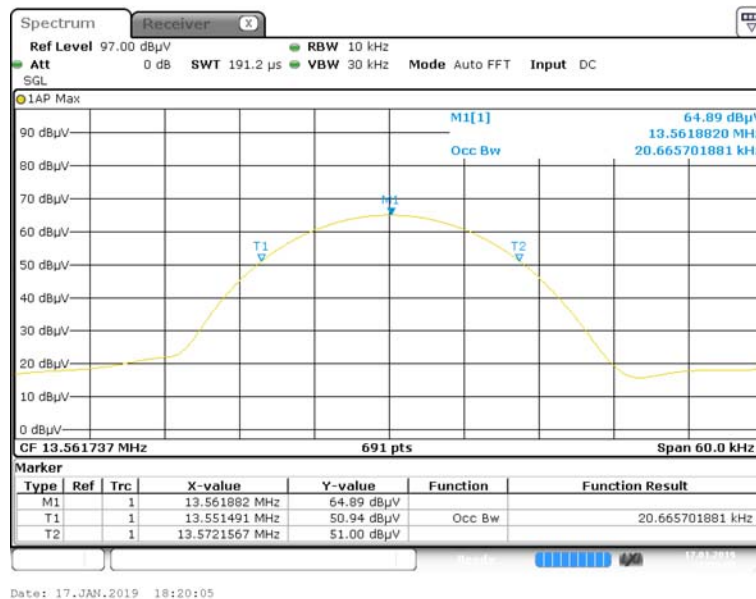
Frequency (MHz)	Emission Bandwidth(20dB down) (kHz)	Occupied Bandwidth(99%) (kHz)
13.56	24.486	20.666

#### Test plots

##### Emission Bandwidth



##### 99% Occupied Bandwidth





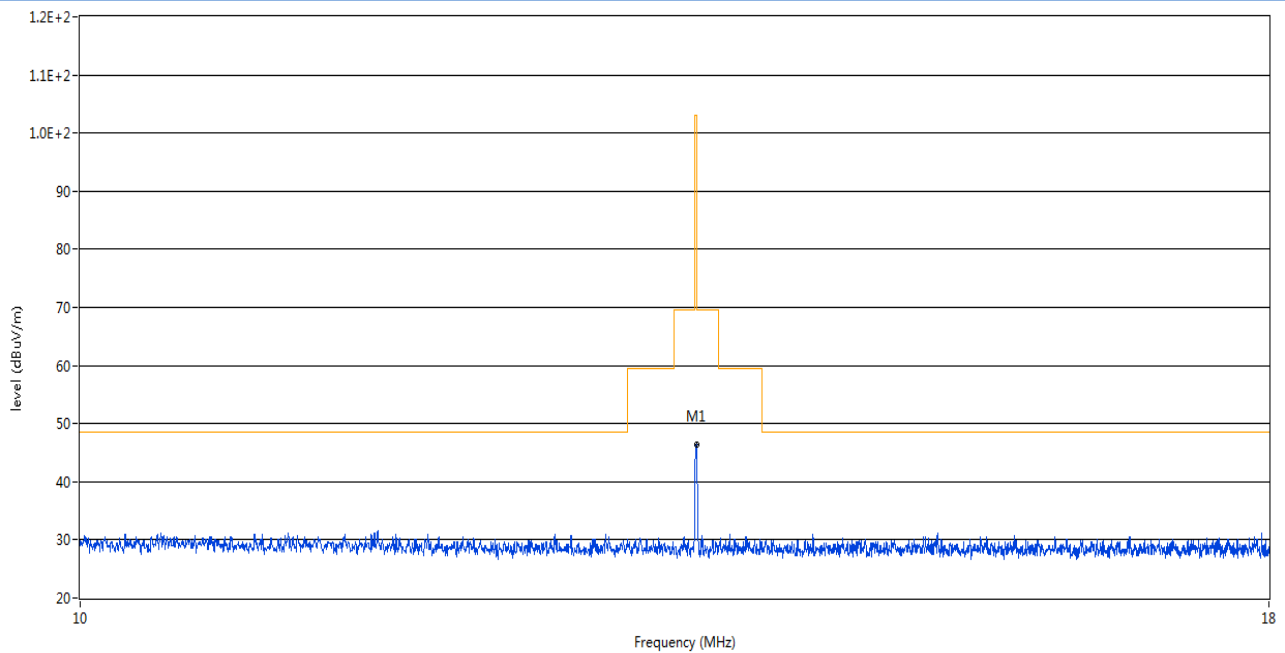
## A.2 Field Strength of Fundamental Emissions

### Test Data

Field Strength of Fundamental Emissions Value					
Frequency (MHz)	Detector	Field Strength (dBuV/m)	Limit @10m (dBuV/m)	Antenna	Margin (dB)
13.561	PEAK	46.40	103.0	Vertical	56.60

### Test Plot

ANT-LOOP ANT Vertical

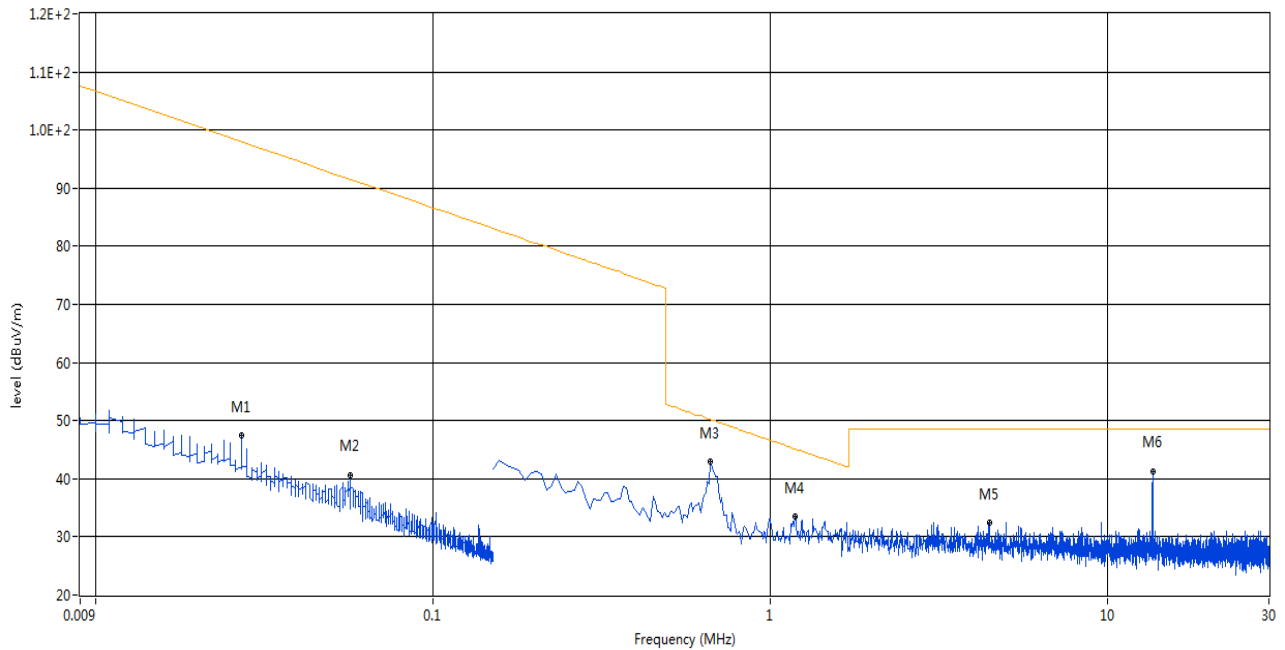


### A.3 Radiated Emissions

Note: This frequency which near 13.56MHz with circle should be ignored because they are NFC carrier frequency.

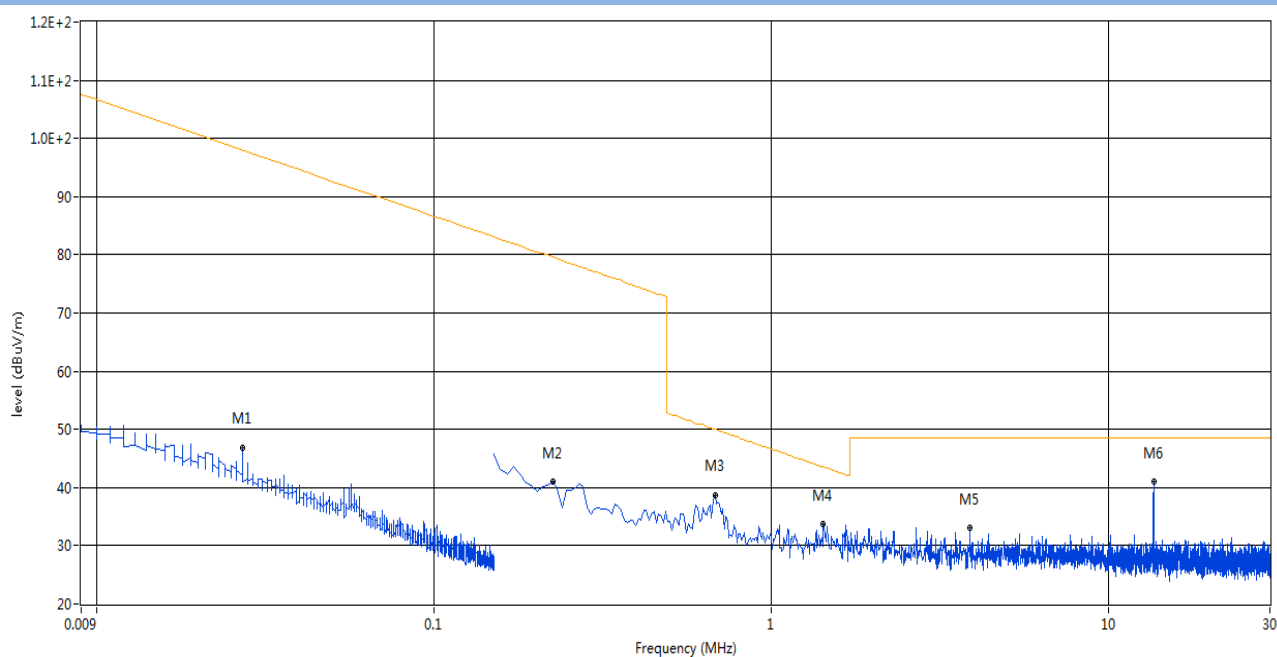
The Data and Plots (9 kHz ~ 30 MHz)(at 10m chamber)

Below 30 MHz ANT Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.027	41.85	20.25	98.0	-56.15	Peak	212.00	100	Vertical	Pass
2	0.057	37.70	20.20	91.5	-53.80	Peak	89.00	100	Vertical	Pass
3	0.665	42.92	20.37	50.1	-7.18	Peak	113.00	100	Vertical	Pass
4	1.180	33.53	20.54	45.2	-11.67	Peak	179.00	100	Vertical	Pass
5	4.448	32.50	20.74	48.5	-16.00	Peak	213.00	100	Vertical	Pass
6	13.560	41.27	20.86	48.5	-7.23	Peak	12.00	100	Vertical	Pass

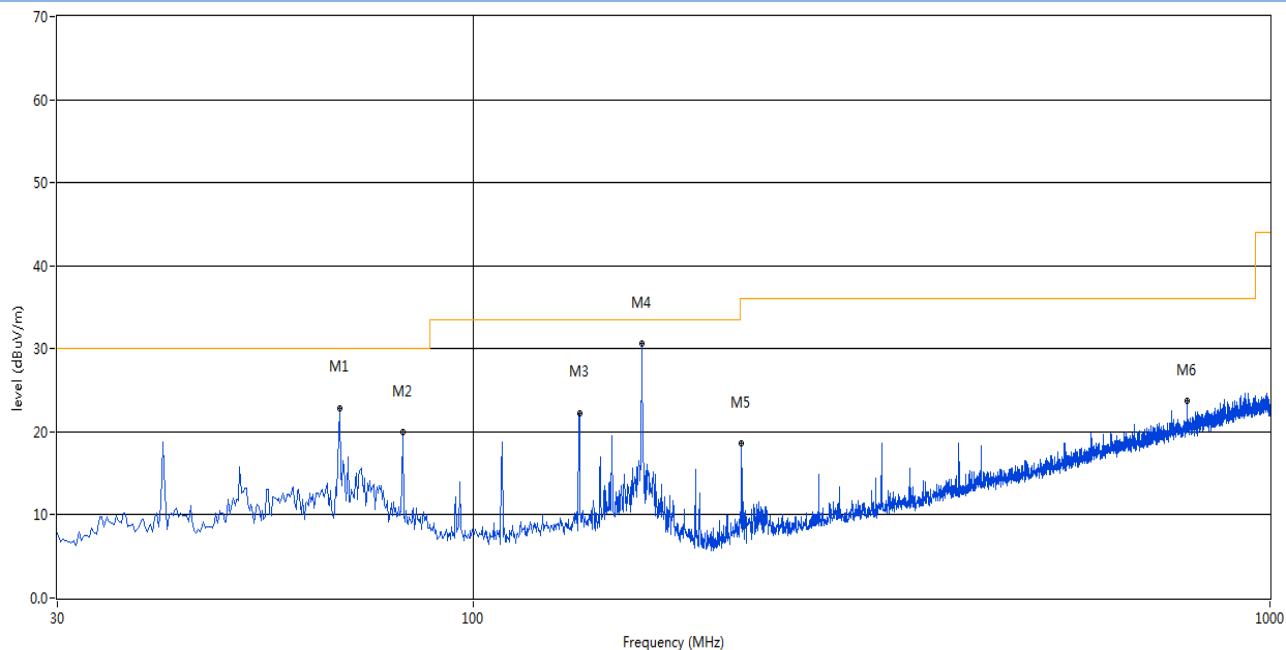
# Below 30 MHz ANT Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	0.027	42.02	20.25	98.0	-55.98	Peak	315.00	100	Horizontal	Pass
2	0.225	40.98	20.12	79.6	-38.62	Peak	25.00	100	Horizontal	Pass
3	0.680	38.77	20.38	50.0	-11.23	Peak	214.00	100	Horizontal	Pass
4	1.426	33.71	20.52	43.5	-9.79	Peak	165.00	100	Horizontal	Pass
5	3.874	32.99	20.66	48.5	-15.51	Peak	14.00	100	Horizontal	Pass
6	13.560	41.08	20.86	48.5	-7.42	Peak	218.00	100	Horizontal	Pass

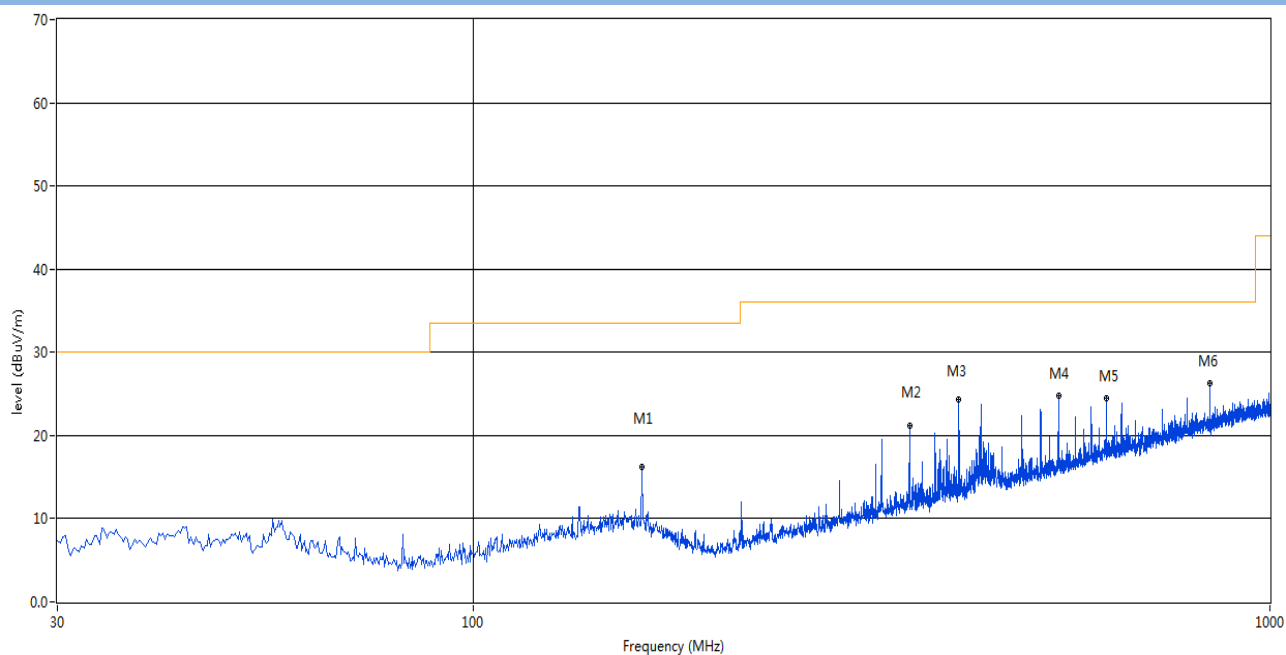
# Test Data and Plots (30 MHz ~ 10th Harmonic)

30 MHz to 1 GHz, ANT Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	67.830	22.87	-29.33	30.0	-7.13	Peak	360.00	200	Vertical	Pass
2	81.410	19.96	-31.24	30.0	-10.04	Peak	360.00	200	Vertical	Pass
3	135.730	22.30	-26.95	33.5	-11.20	Peak	243.00	100	Vertical	Pass
4	162.742	32.19	-26.01	33.5	-1.31	Peak	262.00	146	Vertical	Pass
4*	162.742	30.69	-26.01	33.5	-2.81	QP	262.00	146	Vertical	Pass
5	216.968	18.63	-28.64	36.0	-17.37	Peak	274.00	100	Vertical	Pass
6	786.843	23.67	-14.20	36.0	-12.33	Peak	211.00	100	Vertical	Pass

## 30 MHz to 1 GHz, ANT Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	162.648	16.29	-26.01	33.5	-17.21	Peak	262.00	100	Horizontal	Pass
2	352.525	21.22	-24.34	36.0	-14.78	Peak	196.00	200	Horizontal	Pass
3	406.845	24.37	-22.92	36.0	-11.63	Peak	187.00	200	Horizontal	Pass
4	542.402	24.74	-19.53	36.0	-11.26	Peak	152.00	200	Horizontal	Pass
5	623.882	24.47	-17.42	36.0	-11.53	Peak	360.00	200	Horizontal	Pass
6	840.920	26.33	-13.48	36.0	-9.67	Peak	161.00	100	Horizontal	Pass



## A.4 Frequency Stability

Note 1: Because the 85%(2.805V) and 115% (3.795V)of the rated supply voltage value exceeds the cut-off voltage upper(3.6V) and lower(2.7V) limit of the manufacturer, the cut-off voltage of EUT is test here.

Note 2: The operating temperature range of the EUT is -25°C to 55°C.

OPERATING FREQUENCY:	13561800 Hz
REFERENCE VOLTAGE:	3.3 V
DEVIATION LIMIT:	±0.01%

VOLTAGE (%)	Test Conditions		Frequency(MHz)	Deviation(ppm)	Verdict
	Power (VDC)	Temperature (°C)			
100	3.3	+20°C(Ref)	13.56179500	0.36868	Pass
100		-25	13.56186420	4.73388	
100		-20	13.56184250	3.13380	
100		-10	13.56164790	11.2153	
100		0	13.56183210	2.36694	
100		+10	13.56182240	1.65170	
100		+20	13.56182450	1.80654	
100		+25	13.56179860	0.10323	
100		+30	13.56186410	4.72651	
100		+40	13.56167780	9.01060	
100		+50	13.56179240	0.56039	
100		+55	13.56184410	3.25178	
MAX(Battery End Point, 85)	2.7	+20	13.56162740	12.72690	
MIN(Battery End Point, 115)	3.6	+20	13.56176920	2.27108	

## A.5 Conducted Emissions

Note: Not applicable.

## **ANNEX B TEST SETUP PHOTOS**

Please refer the document “BL-SZ18B0388-AR.PDF”.

## **ANNEX C EUT EXTERNAL PHOTOS**

Please refer the document “BL-SZ18B0388-AW.PDF”.

--END OF REPORT--