

# FCC REPORT


**Applicant:** ShenZhen Aratek Biometrics Technology Co., Ltd.

**Address of Applicant:** 2F, T2-A Building, ShenZhen Software Park, South Area, Hi-Tech Park, Shenzhen, Guangdong, China

**Equipment Under Test (EUT)**

**Product Name:** Mobile ID Terminal

**Model No.:** Marshall, Marshall L, Marshall U, Marshall M, Marshall C, Marshall S, Marshall 8, BM5510, BM5520

**FCC ID:** 

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.225

**Date of sample receipt:** 14 Mar., 2019

**Date of Test:** 14 Mar., to 16 May, 2019

**Date of report issue:** 16 May, 2019

**Test Result:** PASS\*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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## 2 Version

Version No.	Date	Description
00	16 May, 2019	Original


**Tested by:**

  
Test Engineer

**Date:**

16 May, 2019

**Reviewed by:**

  
Project Engineer

**Date:**

16 May, 2019

## 3 Contents

	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 VERSION .....</b>	<b>2</b>
<b>3 CONTENTS .....</b>	<b>3</b>
<b>4 TEST SUMMARY .....</b>	<b>4</b>
<b>5 GENERAL INFORMATION.....</b>	<b>5</b>
5.1 CLIENT INFORMATION.....	5
5.2 GENERAL DESCRIPTION OF E.U.T.....	5
5.3 TEST MODE .....	6
5.4 MEASUREMENT UNCERTAINTY.....	6
5.5 DESCRIPTION OF SUPPORT UNITS.....	6
5.6 LABORATORY FACILITY.....	6
5.7 LABORATORY LOCATION .....	6
5.8 TEST INSTRUMENTSLIST.....	7
<b>6 TEST RESULTS ANDMEASUREMENT DATA .....</b>	<b>8</b>
6.1 ANTENNA REQUIREMENT .....	8
6.2 RADIATED EMISSION .....	9
6.3 20dB BANDWIDTH.....	16
6.4 FREQUENCY TOLERANCE .....	18
6.5 CONDUCTED EMISSION .....	20
<b>7 TEST SETUP PHOTOS.....</b>	<b>23</b>
<b>8 EUT CONSTRUCTIONAL PHOTOS.....</b>	<b>24</b>

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.225 (a)	Pass
Spurious emissions	15.225(d)& 15.209	Pass
20dB Bandwidth	15.215(c)	Pass
Frequency tolerance	15.225 (e)	Pass
Conducted Emission	15.207	Pass

Remarks:

Pass: The EUT complies with the essential requirements in the standard.

## 5 General Information

### 5.1 Client Information

Applicant:	ShenZhen Aratek Biometrics Technology Co., Ltd.
Address:	2F, T2-A Building, ShenZhen Software Park, South Area, Hi-Tech Park, Shenzhen, Guangdong, China
Manufacturer:	ShenZhen Aratek Biometrics Technology Co., Ltd.
Address:	2F,T2-A Building, ShenZhen Software Park, South Area, Hi-Tech Park, Shenzhen, Guangdong, China

### 5.2 General Description of E.U.T.

Product Name:	Mobile ID Terminal
Model No.:	Marshall, Marshall L, Marshall U, Marshall M, Marshall C, Marshall S, Marshall 8, BM5510, BM5520
Operation Frequency:	13.56MHz
Channel numbers:	1
Modulation type:	ASK
Antenna Type:	Internal Antenna
Antenna gain:	0.5dBi
Power supply:	Rechargeable Li-ion Battery DC3.8V-10000mAh
AC adapter:	Model: RH-050250US Input: AC100-240V, 50/60Hz, 0.6A Output: DC 5.0V, 2500mA
Test Sample Condition:	The test samples were provided in good working order with no visible defects.
Remark:	Item No.: Marshall, Marshall L, Marshall U, Marshall M, Marshall C, Marshall S, Marshall 8, BM5510, BM5520 were identical inside, the electrical circuit design, layout, components used and internal wiring, with difference being model name and shell color .

### 5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation		
Pre-Test Mode:			
CCIS has verified the construction and function in typical operation,The EUT was placed on three different polar directions;i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	54.45	51.42	49.21
Final Test Mode:			
According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo).			

### 5.4 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.54 dB (k=2)

### 5.5 Description of Support Units

N/A
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### 5.6 Laboratory Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>● <b>FCC - Registration No.: 727551</b> Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.</li> <li>● <b>IC - Registration No.: 10106A-1</b> The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.</li> <li>● <b>CNAS - Registration No.: CNAS L6048</b> Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.</li> <li>● <b>A2LA - Registration No.: 4346.01</b> This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <a href="https://portal.a2la.org/scopepdf/4346-01.pdf">https://portal.a2la.org/scopepdf/4346-01.pdf</a></li> </ul>
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### 5.7 Laboratory Location

<p>Shenzhen Zhongjian Nanfang Testing Co., Ltd. Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282, Fax: +86-755-23116366 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com</p>
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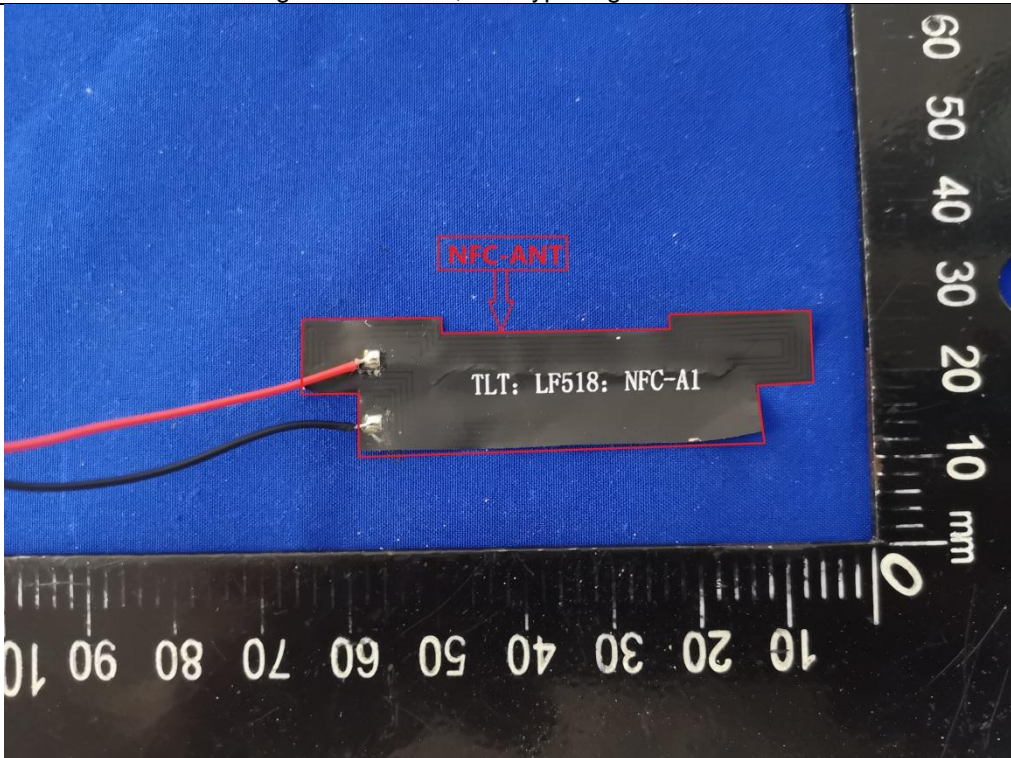
## 5.8 Test Instrumentslist

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Biconical Antenna	SCHWARZBECK	VUBA9117	359	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
Loop Antenna	SCHWARZBECK	FMZB 1519 B	00044	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Signal Generator	Rohde & Schwarz	SMX	835454/016	03-18-2019	03-17-2020
Signal Generator	R&S	SMR20	1008100050	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	07-22-2017	07-21-2020
EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	CCIS0074	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Coaxial Cable	CCIS	N/A	CCIS0086	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

## 6 Test results and Measurement Data

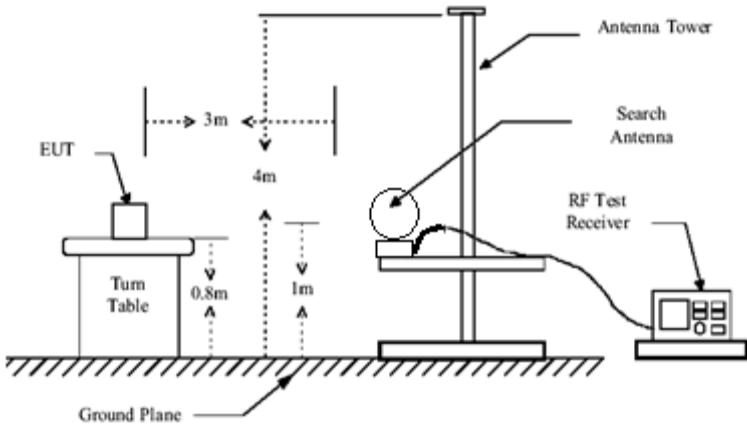
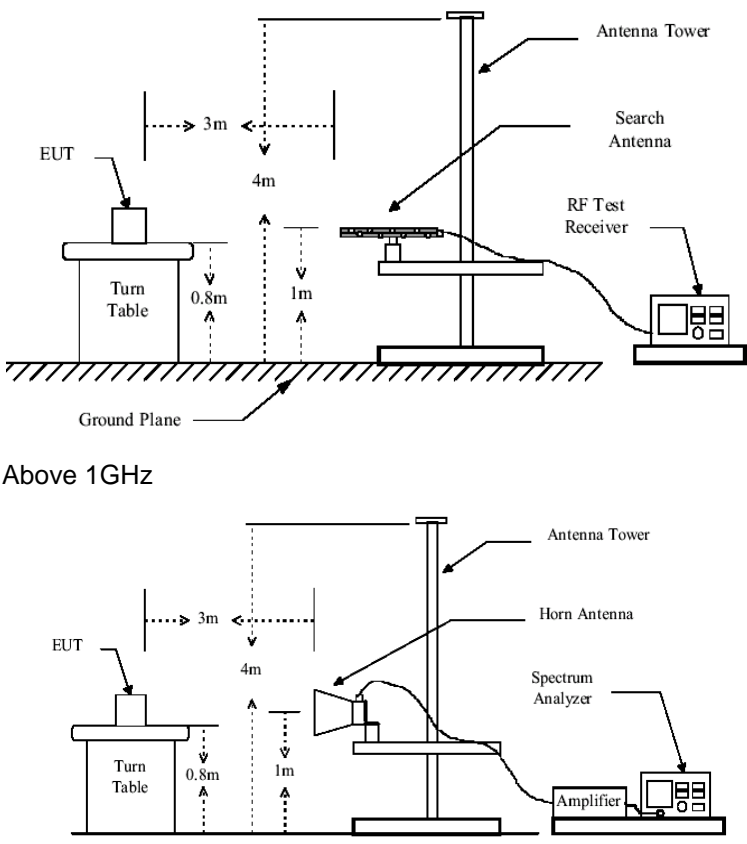
### 6.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<b>15.203 requirement:</b> 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, 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.	
<b>E.U.T Antenna:</b>	
The EUT make use of an integrated antenna, The typical gain of the antenna is 0.5dBi.	
	



## 6.2 Radiated Emission

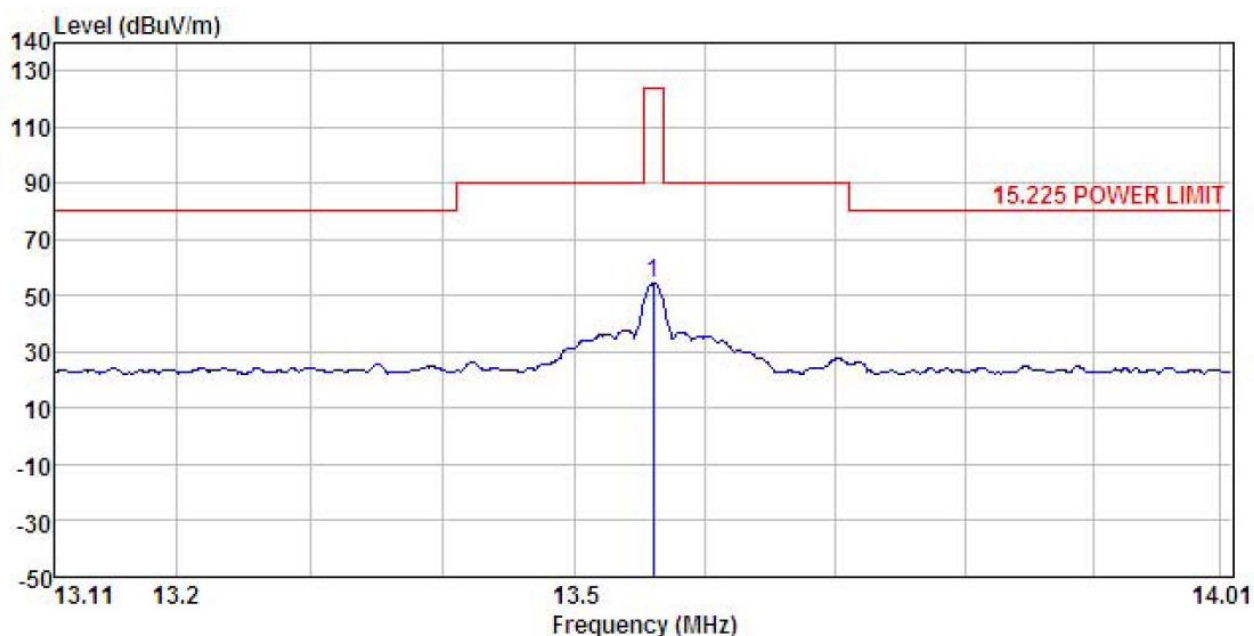
Test Requirement:	FCC Part15 C Section 15.225(a) and 15.209				
Test Method:	ANSI C63.10: 2013				
TestFrequencyRange:	9 kHz to 1000MHz				
Test site:	Measurement Distance: 3m(Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz-150kHz	Quasi-peak	200Hz	600Hz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)	Frequency		Limit (uV/m @30m)		Limit (dBuV/m @3m)
	13.553MHz-13.567MHz		15848		124.0
	13.410MHz-13.553MHz & 13.567MHz-13.710MHz		334		90.5
	13.110MHz-13.410MHz & 13.710MHz-14.010MHz		106		80.5
	Remark: Per FCC part 15.31, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).				
Limit: (Spurious Emissions)	Frequency (MHz)		Limit (uV/m @3m)		Distance (m)
	0.009-0.490		2400/F(kHz)		300
	0.490-1.705		24000/F(kHz)		30
	1.705-30		30		30
	30-88		100		3
	88-216		150		3
	216-960		200		3
	Above 1GHz		500		3
Test Procedure:	<p>a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p>				
Test setup:	9kHz-30MHz				

	<div><p>30MHz-1GHz</p></div>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Measurement Record:	Uncertainty:±4.88 dB
Test results:	Pass

## Measurement Data:

## Field Strength of fundamental signal:

Product Name:	Mobile ID Terminal	Product Model:	Marshall
Test By:	Carey	Test mode:	NFC Tx mode
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Humi: 57%



	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	13.560	28.78	-26.47	0.64	0.00	54.45	124.00	-69.55	

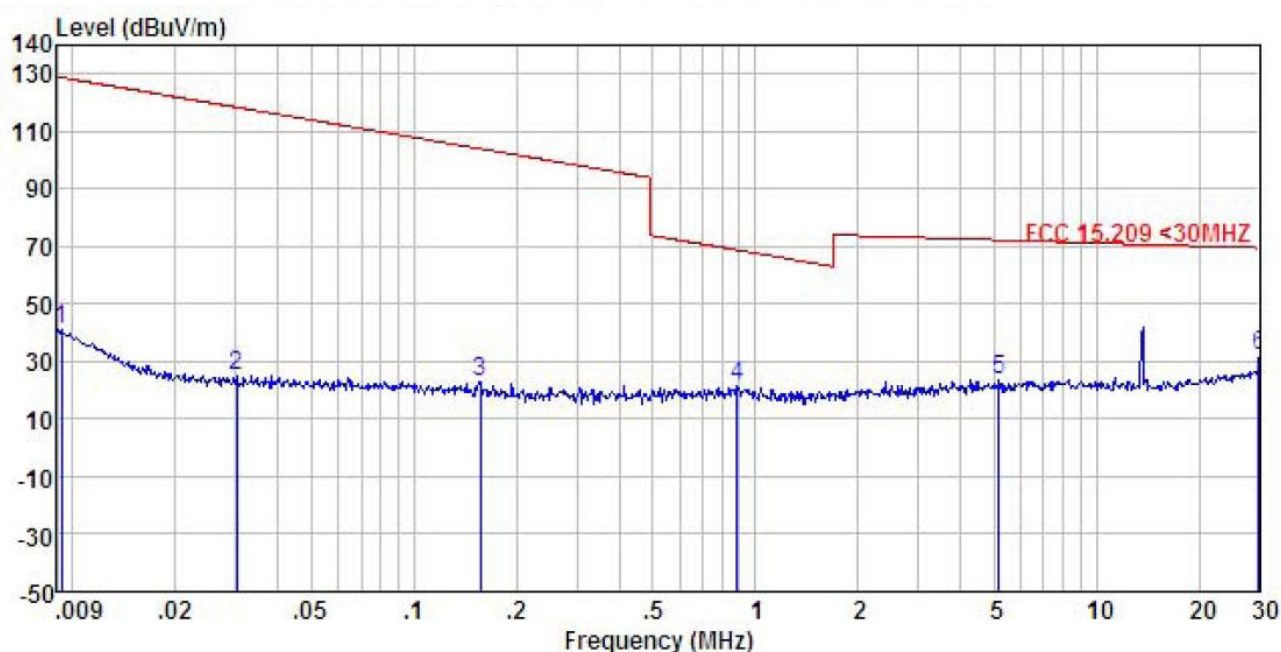
## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

## Spurious Emissions:

Test frequency range: 9 kHz- 30 MHz

Product Name:	Mobile ID Terminal	Product Model:	Marshall
Test By:	Carey	Test mode:	NCF Tx mode
Test Frequency:	150 kHz ~ 30 MHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Humi: 57%

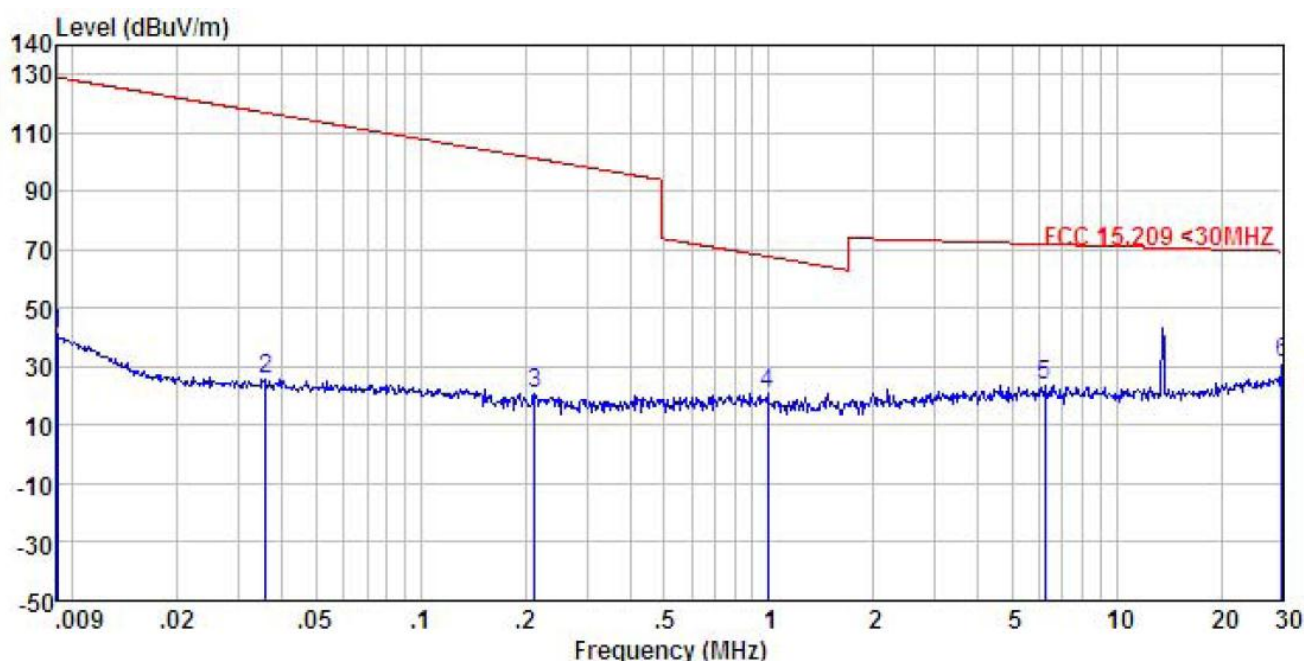


	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	0.009	15.25	-25.66	0.02	0.00	41.11	128.72 -87.61 QP
2	0.030	-0.57	-25.95	0.11	0.00	25.09	118.42 -93.33 QP
3	0.156	-2.40	-26.16	0.28	0.00	23.22	104.00 -80.78 QP
4	0.888	-4.42	-26.30	0.60	0.00	21.38	68.76 -47.38 QP
5	5.202	-2.09	-26.59	0.56	0.00	23.38	72.25 -48.87 QP
6	30.000	4.70	-24.60	0.75	0.00	32.35	69.50 -37.15 QP

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor.
2. The emission levels of 9 kHz~150 kHz are background noise and very lower than the limit, not show in test report.

Product Name:	Mobile ID Terminal	Product Model:	Marshall
Test By:	Carey	Test mode:	NFC Tx mode
Test Frequency:	150 kHz ~ 30 MHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24°C Humi: 57%



	Freq	Read	Antenna	Cable	Preamp	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	0.009	14.93	-25.60	0.02	0.00	40.85	129.00	-88.15 QP
2	0.036	0.25	-25.96	0.14	0.00	25.93	116.93	-91.00 QP
3	0.213	-5.03	-26.21	0.33	0.00	20.59	101.30	-80.71 QP
4	0.994	-5.02	-26.30	0.61	0.00	20.79	67.76	-46.97 QP
5	6.218	-1.57	-26.54	0.51	0.00	23.90	71.97	-48.07 QP
6	30.000	3.52	-24.60	0.75	0.00	31.17	69.50	-38.33 QP

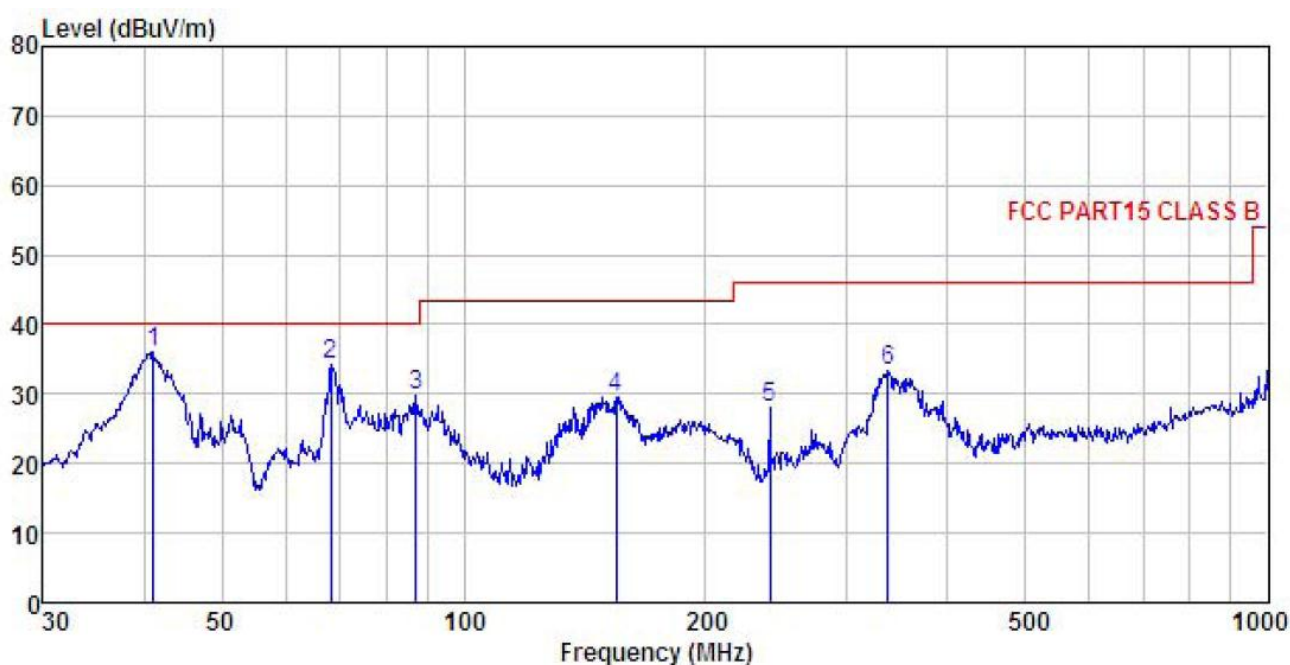
## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of 9 kHz~150 kHz are background noise and very lower than the limit, not show in test report.



Test frequency range: 30MHz-1000MHz

Product Name:	Mobile ID Terminal	Product Model:	Marshall
Test By:	Carey	Test mode:	NFC Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Humi: 57%

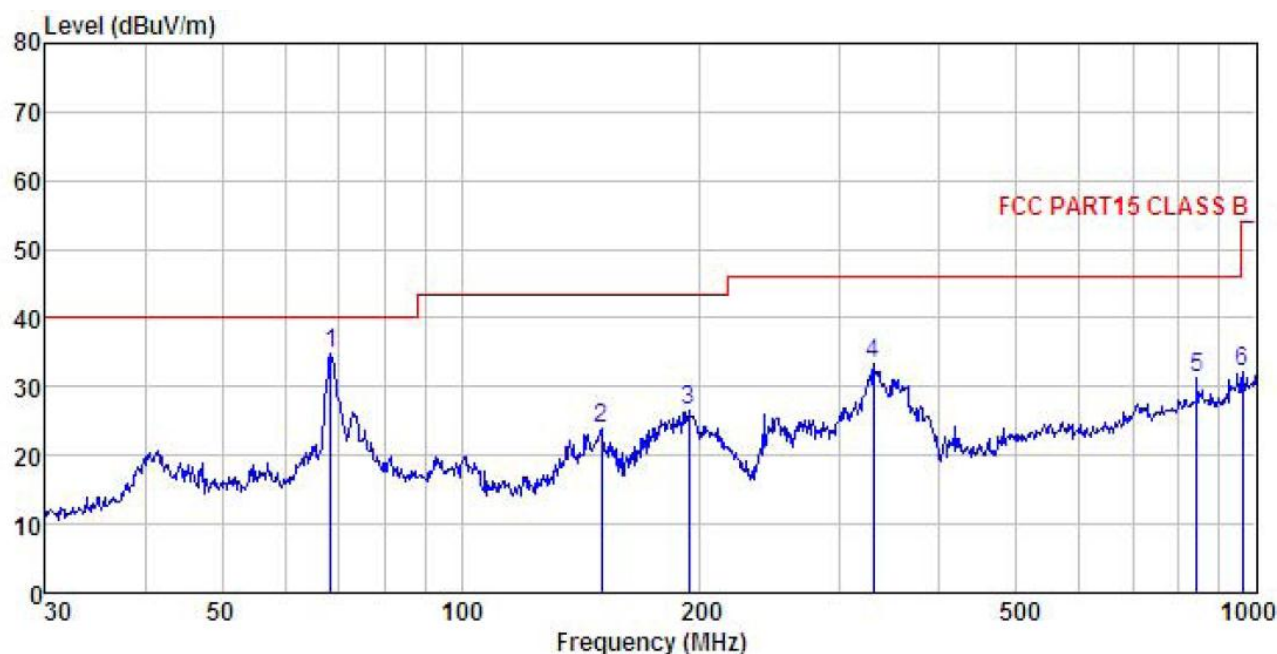


	ReadAntenna	Cable Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level
MHz	dBuV	dB/m	dB	dB	dBuV/m
					dBuV/m
1	41.132	52.17	12.38	1.24	29.89
2	68.391	53.72	8.87	1.46	29.73
3	87.112	48.18	9.26	1.91	29.59
4	154.821	47.17	9.10	2.55	29.18
5	239.987	41.38	12.30	2.82	28.59
6	337.216	44.33	14.36	3.06	28.53

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

<b>Product Name:</b>	Mobile ID Terminal	<b>Product Model:</b>	Marshall
<b>Test By:</b>	Carey	<b>Test mode:</b>	NFC Tx mode
<b>Test Frequency:</b>	30 MHz ~ 1 GHz	<b>Polarization:</b>	Horizontal
<b>Test Voltage:</b>	AC 120/60Hz	<b>Environment:</b>	Temp: 24°C Humi: 57%

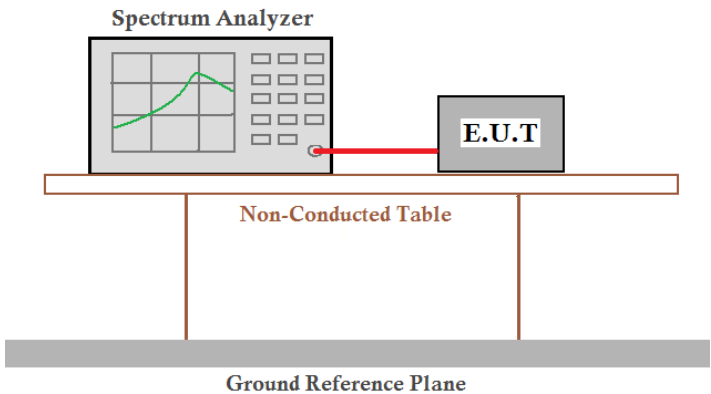


	Freq	ReadAntenna	Cable	Preamp		Limit	Over	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit
		dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	68.631	54.37	8.81	1.49	29.73	34.94	40.00	-5.06 QP
2	150.011	41.73	8.90	2.52	29.22	23.93	43.50	-19.57 QP
3	193.095	42.12	10.38	2.82	28.88	26.44	43.50	-17.06 QP
4	330.195	44.59	14.22	3.04	28.52	33.33	46.00	-12.67 QP
5	842.130	32.55	22.44	4.22	28.03	31.18	46.00	-14.82 QP
6	962.162	32.85	22.73	4.27	27.65	32.20	54.00	-21.80 QP

## Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 6.3 20dB Bandwidth

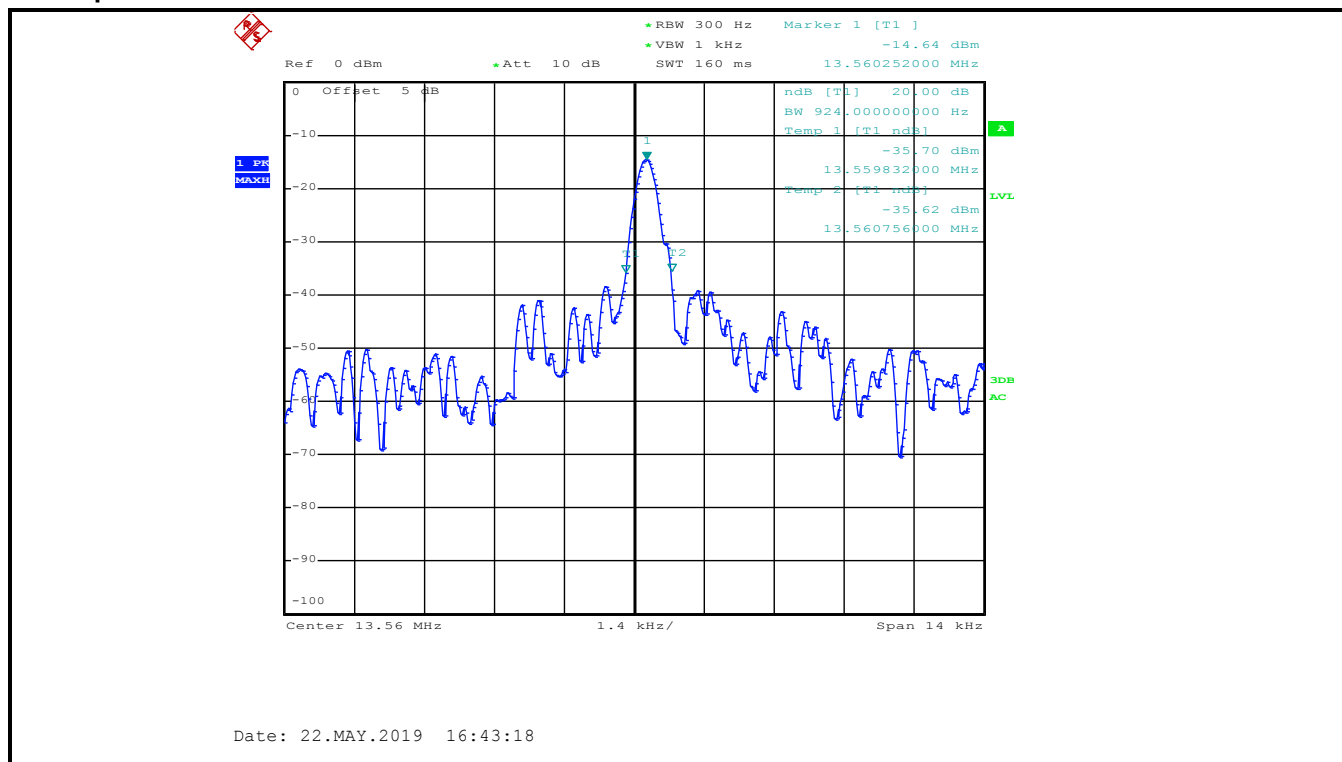
Test Requirement:	FCC Part15 C Section 15.215 (c)
Test Method:	ANSI C63.4:2014
Receiver setup:	RBW=300Hz, VBW=1Kz, detector: Peak
Limit:	The fundamental emission be kept within atleast the central 80% of the permitted band
Test Procedure:	<ol style="list-style-type: none"> <li>1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>2. Set the EUT to proper test channel.</li> <li>3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points.</li> <li>4. Read 20dB bandwidth.</li> </ol>
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

### Measurement Data

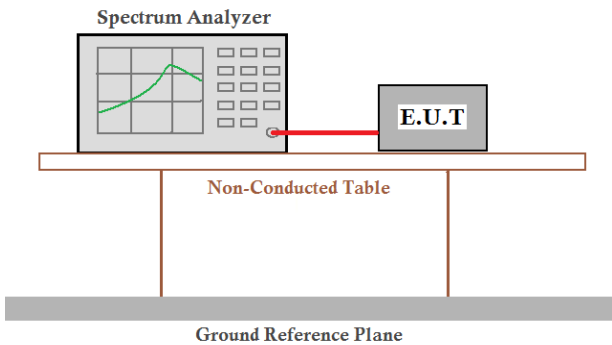
20dB bandwidth (kHz)	Limit (kHz)	Results
0.924	11.2	Passed
Note: For 13.56MHz, permitted Band is 14 kHz, so the Limit is 11.2 kHz.		



Test plot as follows:



## 6.4 Frequency Tolerance

Test Requirement:	FCC Part15 C Section 15.225 (e)
Test Method:	ANSI C63.10: 2013
Receiver setup:	RBW=300Hz, VBW=1Kz, span=14kHz, detector: Peak
Limit:	±0.01% of the operating frequency
Test mode:	Transmitting mode
Test Procedure:	<p><b>Frequency stability V.S. Temperature measurement</b></p> <ol style="list-style-type: none"> <li>1. The equipment under test was powered by a fresh battery.</li> <li>2. RF output was connected to spectrum analyzer via feed through attenuators.</li> <li>3. The EUT was placed inside the temperature chamber.</li> <li>4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency.</li> <li>5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.</li> <li>6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached</li> </ol> <p><b>Frequency stability V.S. Voltage measurement</b></p> <ol style="list-style-type: none"> <li>1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage.</li> <li>2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.</li> </ol> <p>Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.</p>
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

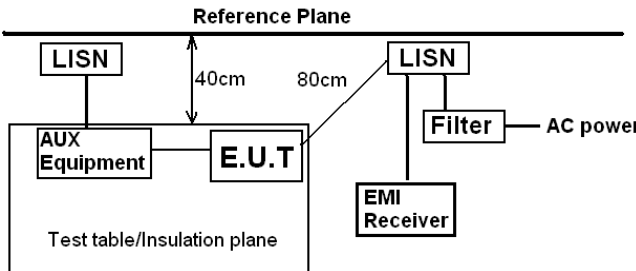
**Measurement Data:****a) Frequency stability V.S. Temperature measurement**

	Temperature (°C)	Frequency Tolerance (MHz)	Frequency Error (%)	Limit (%)	Results
3.8	-20	13.560244	0.001799	0.01	Pass
	-10	13.560247	0.001822	0.01	Pass
	0	13.560247	0.001822	0.01	Pass
	+10	13.560250	0.001844	0.01	Pass
	+20	13.560252	0.001858	0.01	Pass
	+30	13.560252	0.001858	0.01	Pass
	+40	13.560251	0.001851	0.01	Pass
	+50	13.560250	0.001844	0.01	Pass

**b) Frequency stability V.S. Voltage measurement**

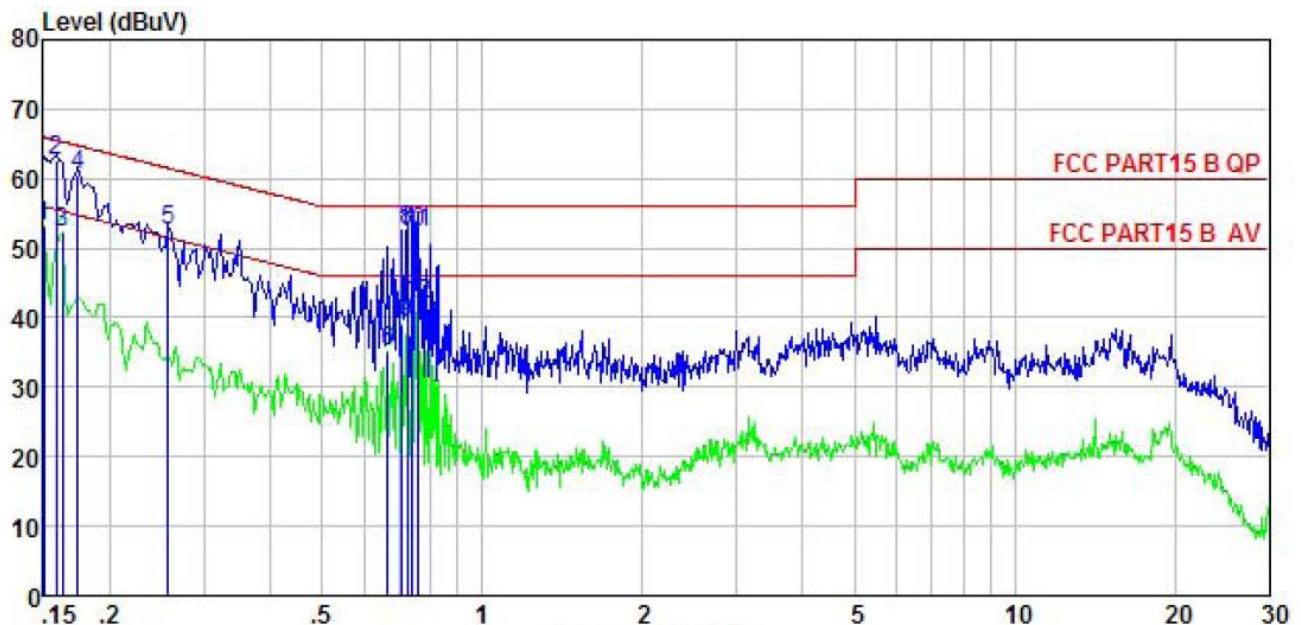
Temperature (°C)	Voltage (Vdc)	Frequency Tolerance (MHz)	Frequency Error (%)	Limit (%)	Results
25	3.50	13.560244	0.001799	0.01	Pass
	3.80	13.560252	0.001858	0.01	Pass
	4.35	13.560252	0.001858	0.01	Pass

## 6.5 Conducted Emission

Test Requirement:	FCC Part15 B Section 15.207		
Test Method:	ANSI C63.4:2014		
TestFrequencyRange:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBμV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	0.5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	 <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test procedure	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.).It provide a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</li> </ol>		
Measurement Record:	Uncertainty: 3.28dB		
Test Instruments:	Refer to section 5.7 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

## Measurement Data:

Product name:	Mobile ID Terminal	Product model:	Marshall
Test by:	Carey	Test mode:	NFC Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Humi: 55%



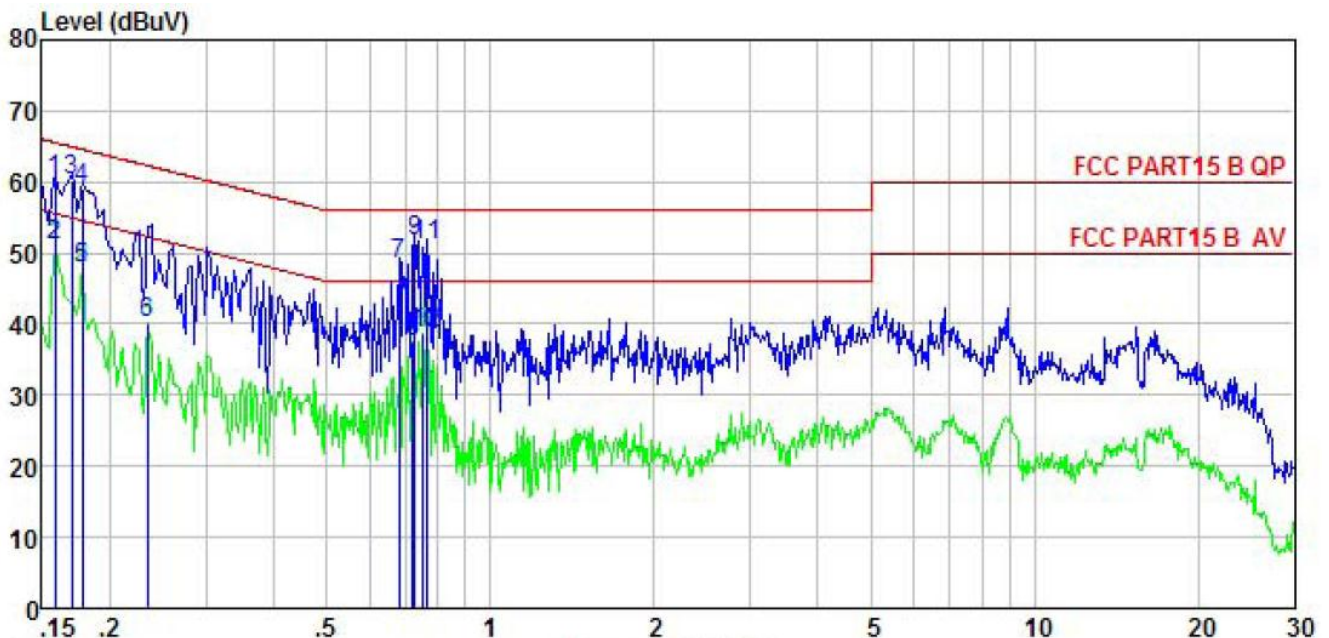
	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	Level	Line	Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	42.73	-0.45	10.78	53.06	56.00	-2.94	Average
2	0.158	52.16	-0.44	10.77	62.49	65.56	-3.07	QP
3	0.162	41.98	-0.44	10.77	52.31	55.34	-3.03	Average
4	0.174	50.26	-0.43	10.77	60.60	64.77	-4.17	QP
5	0.258	42.09	-0.40	10.75	52.44	61.51	-9.07	QP
6	0.665	24.66	-0.38	10.77	35.05	46.00	-10.95	Average
7	0.708	28.51	-0.38	10.77	38.90	46.00	-7.10	Average
8	0.724	42.19	-0.38	10.78	52.59	56.00	-3.41	QP
9	0.724	28.97	-0.38	10.78	39.37	46.00	-6.63	Average
10	0.739	41.70	-0.38	10.79	52.11	56.00	-3.89	QP
11	0.755	41.82	-0.38	10.79	52.23	56.00	-3.77	QP
12	0.755	31.63	-0.38	10.79	42.04	46.00	-3.96	Average

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.



Product name:	Mobile ID Terminal	Product model:	Marshall
Test by:	Carey	Test mode:	NFC Tx mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz	Environment:	Temp: 22.5℃ Humi: 55%



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	----- MHz	----- dBuV	----- dB	----- dB	----- dBuV	----- dBuV	----- dB	-----
1	0.158	50.23	-0.68	10.77	60.32	65.56	-5.24	QP
2	0.158	40.95	-0.68	10.77	51.04	55.56	-4.52	Average
3	0.170	50.11	-0.68	10.77	60.20	64.94	-4.74	QP
4	0.178	48.91	-0.69	10.77	58.99	64.59	-5.60	QP
5	0.178	37.67	-0.69	10.77	47.75	54.59	-6.84	Average
6	0.234	30.21	-0.67	10.75	40.29	52.30	-12.01	Average
7	0.679	38.21	-0.64	10.77	48.34	56.00	-7.66	QP
8	0.720	27.38	-0.64	10.78	37.52	46.00	-8.48	Average
9	0.727	41.49	-0.64	10.78	51.63	56.00	-4.37	QP
10	0.751	28.42	-0.64	10.79	38.57	46.00	-7.43	Average
11	0.763	40.82	-0.64	10.80	50.98	56.00	-5.02	QP
12	0.763	28.62	-0.64	10.80	38.78	46.00	-7.22	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss.