

FCC RADIO TEST REPORT

FCC ID: 2AQP8-C50

Product: Bar code Hand Terminal

Trade Mark: N/A

Model No.: C50

**Additional Model: C40, C43, C60, C70, C80, C90,
R30, R40, R50, R60, R70, R80, R90, MS8288W, MS8288F, MS8588**

Report No.: UNIA2018050831-7FR-01

Issued Date: Sep. 06, 2018

Issued for:

Shenzhen JOAN Technology Co., Ltd.

**Rm 201, No. 22.1 Area, 5th Industrial Zone, Shangfen, Minzhi, Longhua
District, Shenzhen, China**

Issued By:

Shenzhen United Testing Technology Co., Ltd.

**2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang
Community, Xixiang Str, Bao'an District, Shenzhen, China**

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Appendix: Photographs of Test Setup

1. Test Certification

Product:	Bar code Hand Terminal
Trade Mark:	N/A
Model No.:	C50
Additional Model:	C40, C43, C60, C70, C80, C90, R30, R40, R50, R60, R70, R80, R90, MS8288W, MS8288F, MS8588
Applicant:	Shenzhen JOAN Technology Co., Ltd.
Address:	Rm 201, No. 22.1 Area, 5th Industrial Zone, Shangfen, Minzhi, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen JOAN Technology Co., Ltd.
Address:	Rm 201, No. 22.1 Area, 5th Industrial Zone, Shangfen, Minzhi, Longhua District, Shenzhen, China
Date of Test:	May 20, 2018 ~ Aug. 20, 2018
Applicable Standards:	FCC Rules and Regulations Part 15 Subpart C Section 15.227 ANSI C63.10: 2013

The above equipment has been tested by Shenzhen United Testing Technology Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

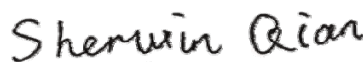


Kahn yang

Date:

Sep. 06, 2018

Reviewed By:



Sherwin Qian

Date:

Sep. 06, 2018

Approved By:



Liuze

Date:

Sep. 06, 2018

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
Conduction Emission, 0.15MHz to 30MHz	§15.207	PASS
Radiation Emission	§15.225, §15.205, §15.209, §15.35	PASS
Occupied Bandwidth	§15.215	PASS
Frequency stability	§15.225 §2.1055	PASS

Note:

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

3. EUT Description

Product Name:	Bar code Hand Terminal
Trade Mark:	N/A
Model :	C50
Additional Model:	C40, C43, C60, C70, C80, C90, R30, R40, R50, R60, R70, R80, R90, MS8288W, MS8288F, MS8588
Operation Frequency:	13.56MHz
Modulation Technology:	FSK
Antenna Type:	Coil Antenna
Antenna Gain:	0dBi
Power Supply:	DC 3.8V, 5000mAh
Remark:	All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.

4. General Information

4.1. Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation
<p>The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

Per-test mode.

We have 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)	62.47	65.62	62.59

Final Test Mode:

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:
Y axis (see the test setup photo)

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5. Facilities and Accreditations

5.1. Facilities

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:
CNAS-LAB Code: L6494

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

Designation Number: CN1227

Test Firm Registration Number: 674885

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files.

5.2. Location

Shenzhen United Testing Technology Co., Ltd.

Address: 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.


No.	Item	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^{\circ}\text{C}$
7	Humidity	$\pm 1.0\%$

6. MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Horn Antenna	Sunol	DRH-118	A101415	2018.9.29
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2018.9.29
3	PREAMP	HP	8449B	3008A00160	2018.9.9
4	PREAMP	HP	8447D	2944A07999	2018.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2018.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2018.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2018.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2018.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2018.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2018.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2018.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2018.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2019.3.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2019.3.14
15	RF power divider	Anritsu	K241B	992289	2018.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2018.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2018.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2018.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2018.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2019.1.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2018.11.02
22	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2019.03.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2018.10.24
24	Active Loop Antenna	Com-Power	AL-130R	10160009	2019.05.10
25	Power Meter	KEYSIGHT	N1911A	MY50520168	2019.05.10
26	Frequency Meter	VICTOR	VC2000	997406086	2019.05.10
27	DC Power Source	HYELEC	HY5020E	055161818	2019.05.10

7. Test Results and Measurement Data

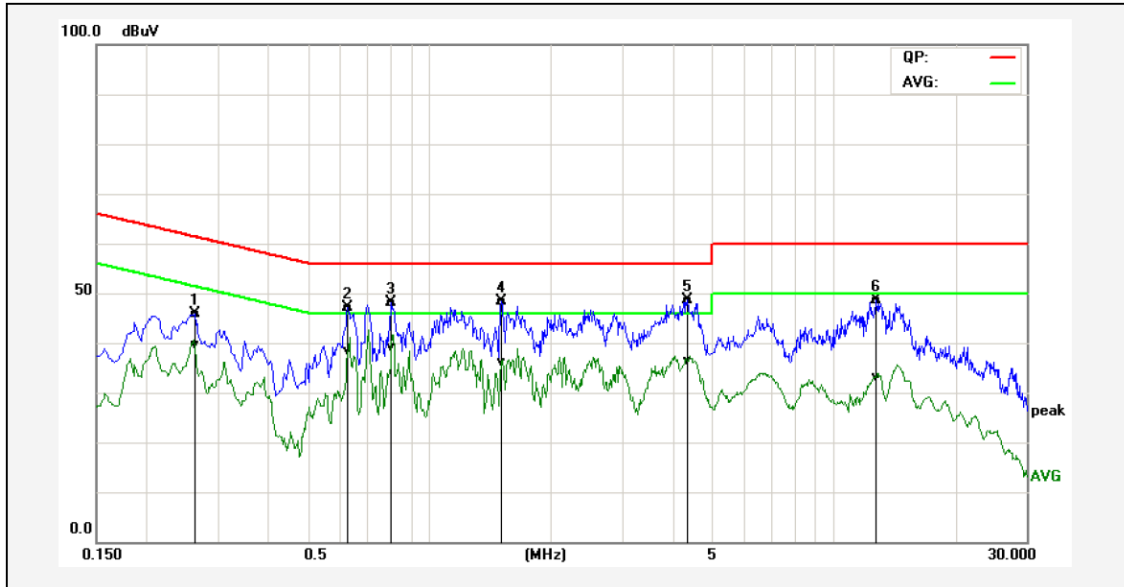
7.1. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
<p>15.203 requirement: 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.</p> <p>15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
E.U.T Antenna:	Coil Antenna
The antenna is Coil antenna which permanently attached, and the best case gain of the antenna is 0dBi.	
	

7.2. Conducted Emission

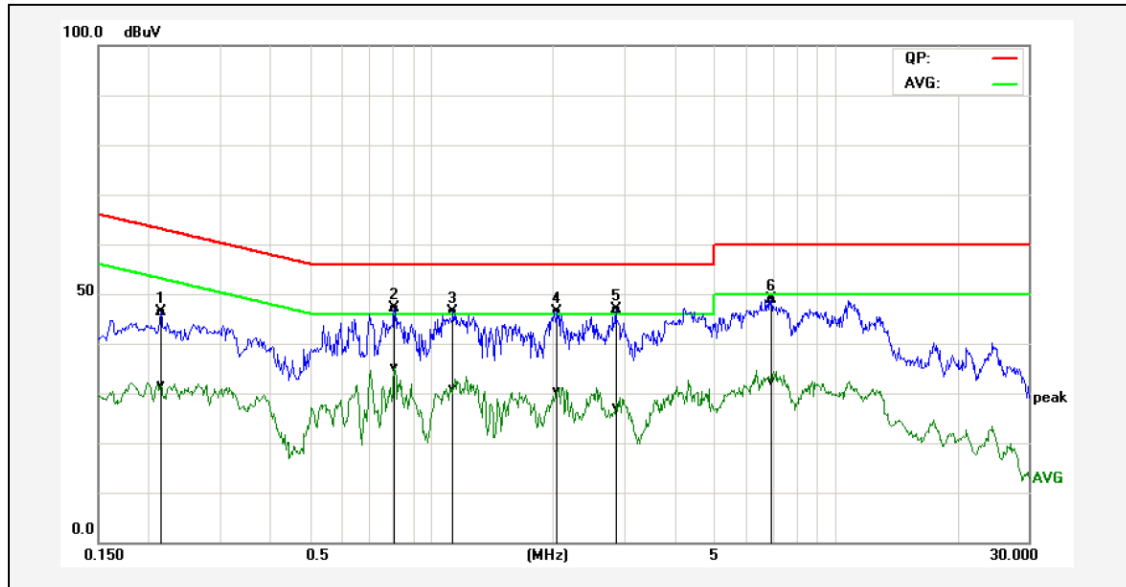
7.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test Setup:	<div><p>Reference Plane</p><p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p></div>														
Test Mode:	Transmitting Mode														
Test Procedure:	<div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>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).</div><div>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: 2014 on conducted measurement.</div></div>														
Test Result:	PASS														
Remark:	EUT was tested at AC 120V and 240V, only the worst result of AC 120V was reported.														



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.2630	35.90	29.63	10.05	45.95	39.68	61.33	51.34	-15.38	-11.66	Pass
2P	0.6300	37.07	28.43	10.02	47.09	38.45	56.00	46.00	-8.91	-7.55	Pass
3*	0.8060	38.10	29.09	10.09	48.19	39.18	56.00	46.00	-7.81	-6.82	Pass
4P	1.5100	38.20	26.09	10.14	48.34	36.23	56.00	46.00	-7.66	-9.77	Pass
5P	4.3460	38.41	26.28	10.12	48.53	36.40	56.00	46.00	-7.47	-9.60	Pass
6P	12.7620	38.38	23.00	10.20	48.58	33.20	60.00	50.00	-11.42	-16.80	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.



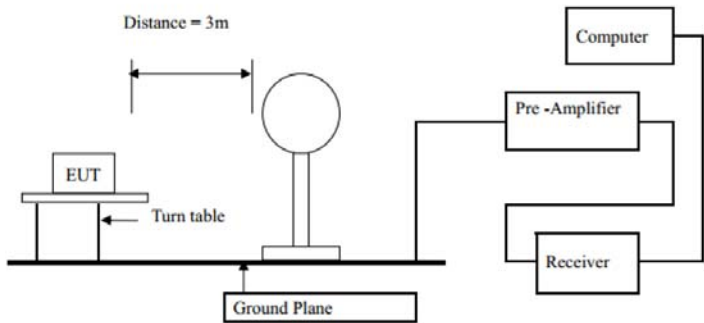
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.2140	36.27	21.65	10.06	46.33	31.71	63.04	53.05	-16.71	-21.34	Pass
2*	0.8100	37.02	25.03	10.09	47.11	35.12	56.00	46.00	-8.89	-10.88	Pass
3P	1.1340	36.24	20.69	10.13	46.37	30.82	56.00	46.00	-9.63	-15.18	Pass
4P	2.0540	36.29	20.30	10.18	46.47	30.48	56.00	46.00	-9.53	-15.52	Pass
5P	2.8580	36.70	17.07	10.18	46.88	27.25	56.00	46.00	-9.12	-18.75	Pass
6P	6.9340	38.88	22.24	10.12	49.00	32.36	60.00	50.00	-11.00	-17.64	Pass

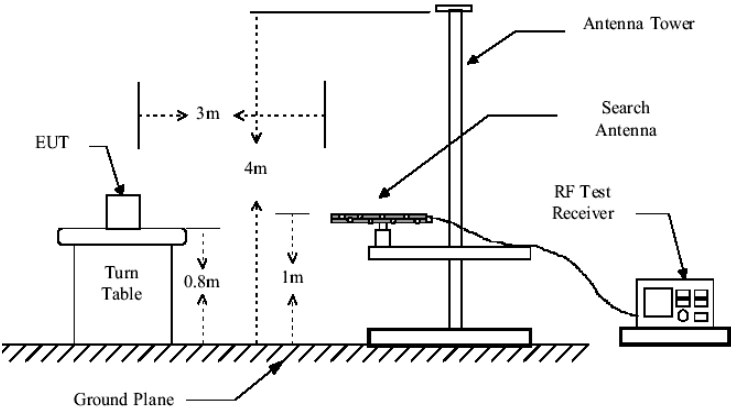
Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

7.3. Radiated Emission Measurement

7.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.225(a) and 15.209				
Test Method:	ANSI C63.10:2013				
Frequency Range:	9 kHz to 1 GHz				
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal & Vertical				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
	FCC Part15 C Section 15.225				
	Frequency (MHz)		Limit (uV/m @30m)	Limit (dBuV/m @3m)	Detector
	13.110-13.410		106	80.5	QP
	13.410-13.553		334	90.5	QP
	13.553-13.567		15848	124.0	QP
	13.567-13.7110		224	90.5	QP
	13.710-14.010		106	80.5	QP
	Note: RF Voltage (dBuV) = 20 log RF Voltage (uV)				
	Limit (dBuV/m @3m) = 20log(Limit (uV/m @30m)) + 40				
	FCC Part15 C Section 15.209				
	Frequency Range (MHz)		Distance (m)	Field strength (dB μ V/m)	Detector
	0.009-0.490		3	20log 2400/F (kHz) + 80	QP
	0.490-1.705		3	20log 24000/F (kHz) + 40	QP
	1.705-30		3	20log 30 + 40	QP
	30-88		3	40.0	40.0
88-216		3	43.5	43.5	
216-960		3	46.0	46.0	
Above 960		3	54.0	54.0	
Note:					
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)					
2. In the Above Table, the tighter limit applies at the band edges.					
3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT					
4. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand). After pre-test. It was found that the					

	<p>worse radiated emission was get at the lying position.</p> <p>5. If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula $Ld1 = Ld2 * (d2/d1)$</p> <ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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:</p>	<p>For radiated emissions below 30MHz</p>  <p>30MHz to 1GHz</p>

	 <p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a Turn Table at a height of 0.8m. A Search Antenna is mounted on an Antenna Tower at a height of 1m. The horizontal distance between the EUT and the Search Antenna is 3m. The vertical distance between the EUT and the Search Antenna is 4m. The entire setup is on a Ground Plane. An RF Test Receiver is connected to the Search Antenna.</p>
Test Mode:	Transmitting Mode
Test results:	PASS

7.3.2. Test Data

Field Strength of Fundamental

Frequency	Reading	Correction Factor	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	/
13.2100	32.23	-6.28	25.95	80.51	54.56	H	QP
13.2100	33.17	-6.28	26.89	80.51	53.62	V	QP
13.8500	36.72	-6.26	30.46	80.51	50.05	H	QP
13.8500	34.91	-6.26	28.65	80.51	51.86	V	QP
13.5600	75.34	-6.29	69.05	124	54.95	H	Peak
13.5600	72.17	-6.29	65.82	124	58.16	V	Peak
13.4500	46.23	-6.25	39.98	90.47	50.49	H	QP
13.4500	45.38	-6.25	39.13	90.47	51.34	V	QP
13.6200	42.17	-6.23	35.94	90.47	54.53	H	QP
13.6200	43.75	-6.23	37.52	90.47	52.95	V	QP

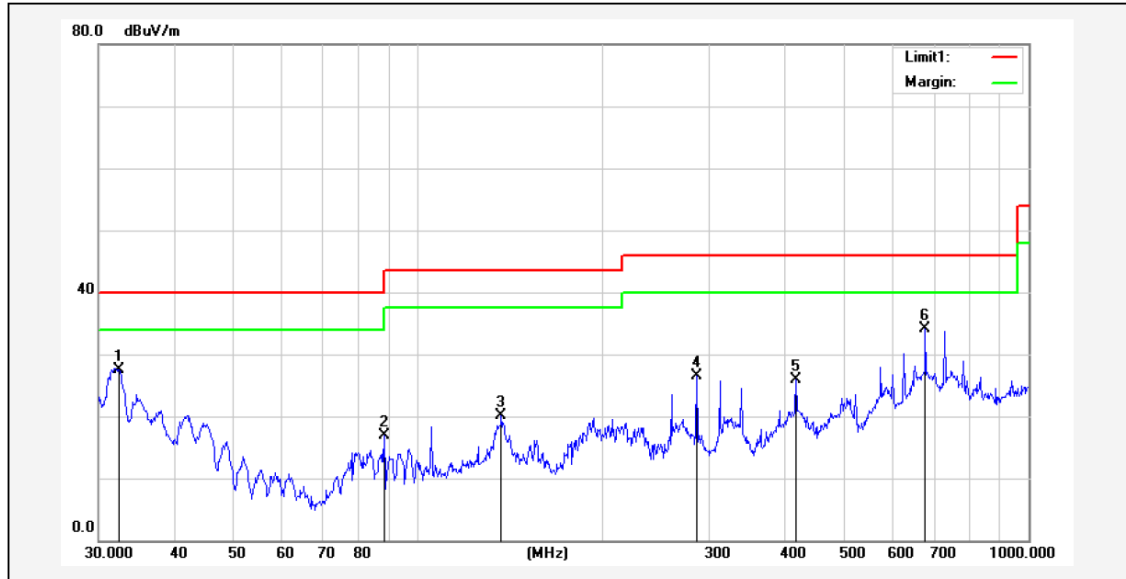
Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
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--	--	--
--	--	--
--	--	--

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

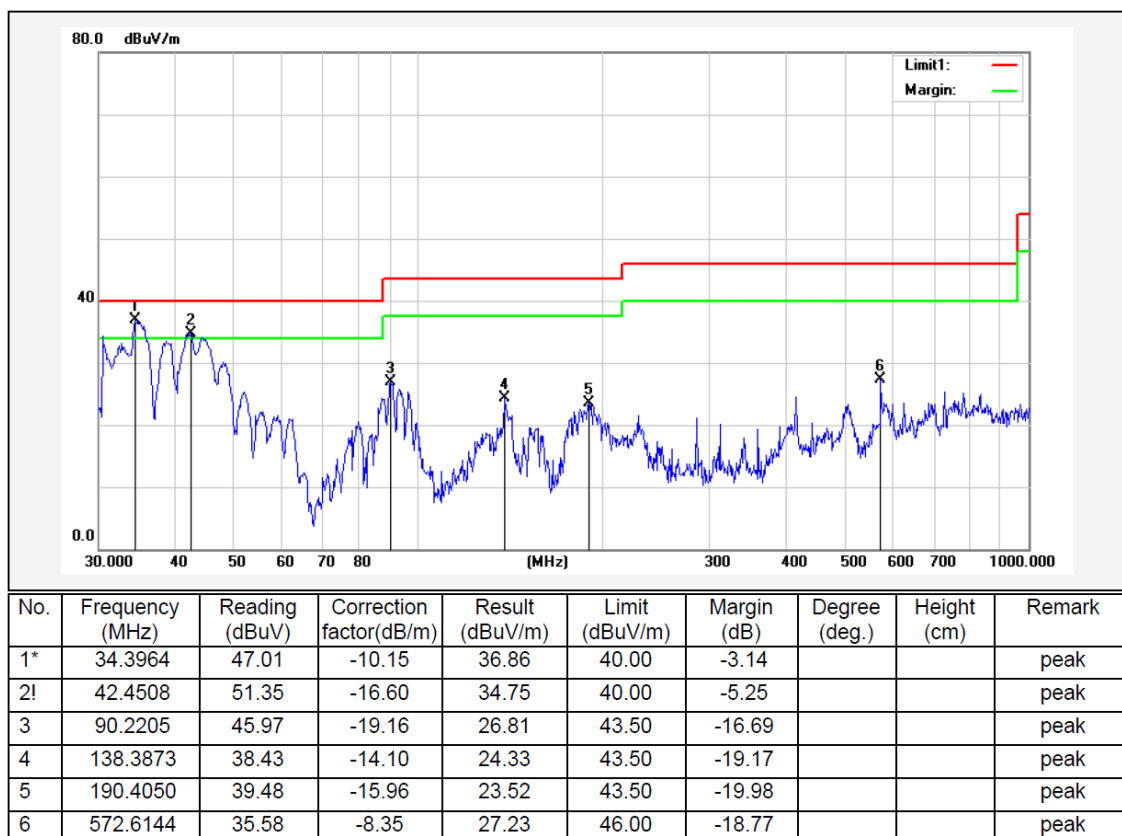
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.4060	36.21	-8.65	27.56	40.00	-12.44			peak
2	88.0330	36.24	-19.27	16.97	43.50	-26.53			peak
3	136.9391	34.28	-14.16	20.12	43.50	-23.38			peak
4	285.9778	39.26	-12.82	26.44	46.00	-19.56			peak
5	416.1791	36.94	-11.02	25.92	46.00	-20.08			peak
6*	677.5798	40.44	-6.26	34.18	46.00	-11.82			peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit

Factor = Ant. Factor + Cable Loss – Pre-amplifier




Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit

Factor = Ant. Factor + Cable Loss – Pre-amplifier

7.4. Occupied Bandwidth

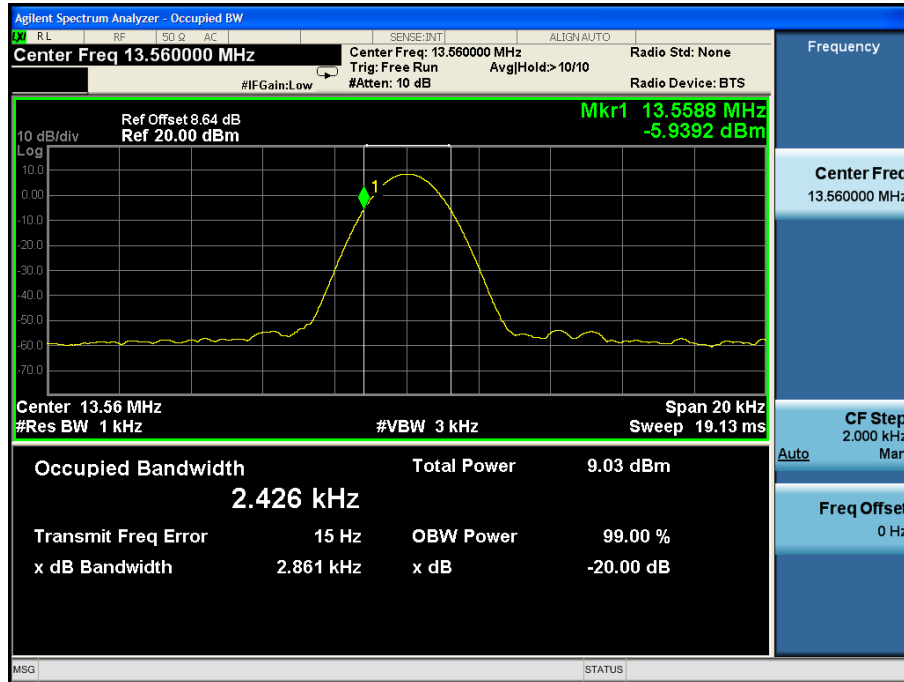
7.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013
Limit:	N/A
	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; $RBW \geq 1\%$ of the 20 dB bandwidth; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Test setup:	 <p>The diagram illustrates the test setup. On the left is a green Spectrum Analyzer with a blue screen and two small circular ports. A black cable connects these ports to a yellow rectangular box on the right, which is labeled 'EUT'.</p>
Test Mode:	Transmitting Mode
Test results:	PASS

7.4.2. Test data

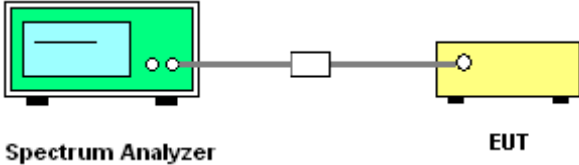
Test Channel (MHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
13.56	2.861	N/A	PASS

Test plots as follows:



7.5. Frequency stability

7.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.225
Test Method:	ANSI C63.10: 2013
Limit:	+/-0.01%
	<ol style="list-style-type: none"> 1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a spectrum analyzer. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to -20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test setup:	 <p>The diagram illustrates the test setup. On the left is a green box labeled 'Spectrum Analyzer'. A cable connects it to a yellow box on the right labeled 'EUT'. A small white box is positioned in the middle of the cable. Below the Spectrum Analyzer is the text 'Spectrum Analyzer' and below the EUT is the text 'EUT'.</p>
Test Mode:	Transmitting Mode
Test results:	PASS

7.5.2. Test data

Voltage (Vdc)	Temperature (°C)	Frequency (MHz)	Deviation (%)	Limit (%)
6	0	13.560147	0.00108	+/-0.01%
6	10	13.560252	0.00186	
6	20	13.560151	0.00111	
6	30	13.560276	0.00204	
6	40	13.560216	0.00159	
6	45	13.560185	0.00136	
6.4	20	13.560167	0.00123	
5.7	20	13.560158	0.00117	

Appendix: Photographs of Test Setup

Radiated Emission



Conduction Emission



*******END OF REPORT*******