Test Report

FCC Part15 Subpart C

Product Name	:	Barcode Scanner
Model No.	:	8680i
FCC ID	:	HD5-8680A

Applicant	:	HONEYWELL INTERNATIONAL INC Honeywell Safety and Productivity Solutions
Address	:	9680 OLD BAILES RD FORT MILL SC 29707-7539

Date of Receipt	:	Mar. 09, 2018
Test Date	:	Mar. 09, 2018~ Apr. 04, 2018
Issued Date	:	Apr. 08, 2018
Report No.	:	1832060R-RF-US-P06V05
Report Version	:	V1.0

Test Report Certification

Issued Date : Apr. 08, 2018
Report No. : 1832060R-RF-US-P06V05

Product Name	:	Barcode Scanner
Applicant	:	HONEYWELL INTERNATIONAL INC
Address	:	Honeywell Safety and Productivity Solutions 9680 OLD BAILES RD FORT MILL SC 29707-7539
Manufacturer	:	1、 HONEYWELL INTERNATIONAL INC Honeywell Safety and Productivity Solutions 2、Metro(Suzhou)Technologies Co.,Ltd
Address	:	1、9680 OLD BAILES RD FORT MILL SC 29707-7539 2、No.221 Xinghai street China-Singapore Suzhou Industrial Park
Model No.	:	8680i
FCC ID	:	HD5-8680A
EUT Voltage	:	DC 3.8V
Test Voltage	:	AC 120V/60Hz
Brand Name	:	Honeywell
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C
Test Result	:	Complied
Performed Location	:	DEKRA Testing and Certification (Suzhou) Co., Ltd. No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098 FCC Designation Number: CN1199

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Reviewed By : Frank he

(Senior Engineer: Frank He)

Approved By : Harry Zhao

(Engineering Manager: Harry Zhao)

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1832060R-RF-US-P06V05	V1.0	Initial Issued Report	Apr. 08, 2018

1. General Information

1.1. EUT Description

Product Name	Barcode Scanner
Model No.	8680i
Working Voltage	DC 3.8V
Frequency Range	13.56 MHz
Channel Number	1
Type of Modulation	ASK
Data Rate	106kbps

Note: They are only for different marketing requirement.

1.2. Working Frequency of Each Channel:

Working Frequency of Each Channel:							
Channel	Frequency						
00	13.56MHz						

1.3. Antenna information

Model No.	N/A					
Antenna manufacturer	N/A					
Antenna Delivery	☒	1*TX+1*RX	☐	2*TX+2*RX	☐	3*TX+3*RX
Antenna technology	☒	SISO				
	☐	MIMO	☐	Basic		
			☐	CDD		
			☐	Sectorized		
			☐	Beam-forming		
Antenna Type	☐	External	☐	Dipole		
			☐	Sectorized		
	☒	Internal	☐	PIFA		
			☐	PCB		
			☐	Ceramic Chip Antenna		
			☒	Loop antenna		
			☐	Type F antenna		

Antenna Technology	Ant Gain (dBi)
☒ SISO	4.3

1.4. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit

Note:

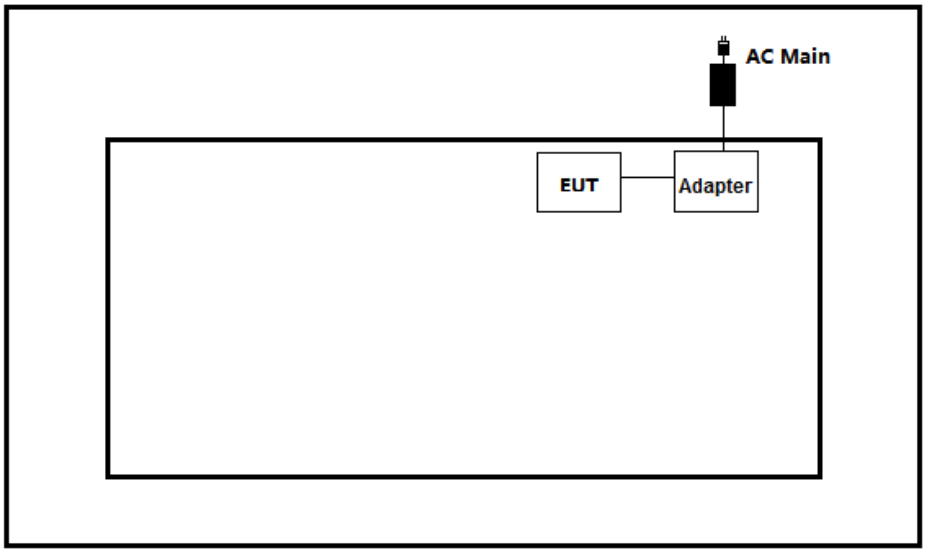
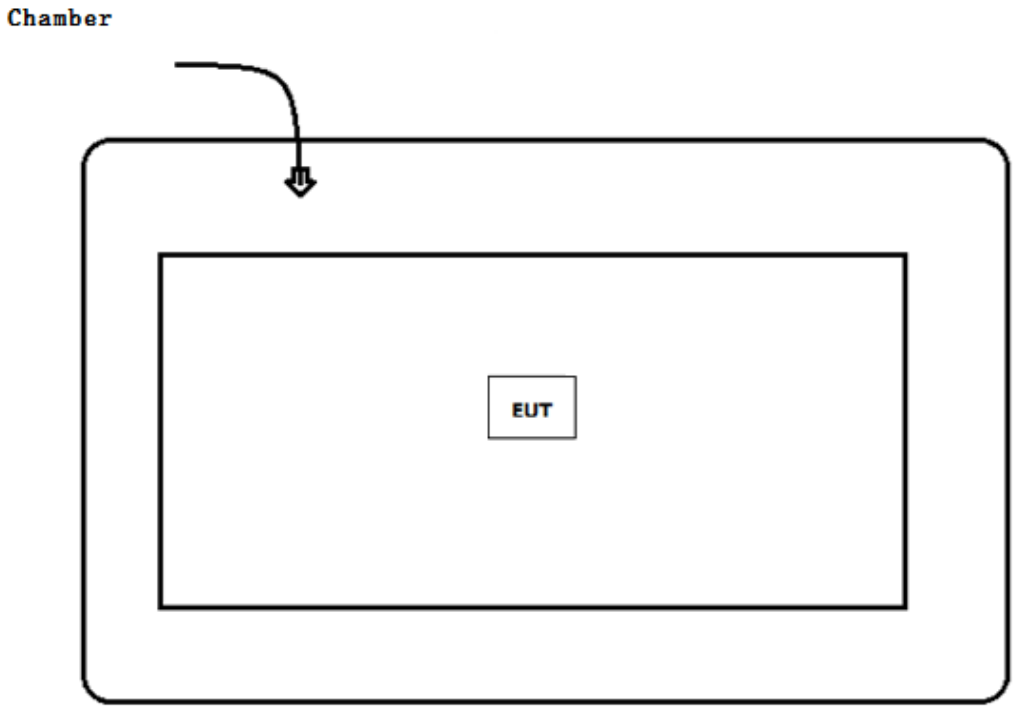
1. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

1.5. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

1.6. Configuration of Tested System

Test setup Diagram- AC Line Conducted Emission Test

Test setup Diagram- Radiated Emission


1.7. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Start to continue transmit.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Performed Test Item	Normative References	Limit	Result
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C Section 15.207	FCC 15.207	PASS
Field Strength of Fundamental	FCC CFR Title 47 Part 15 Subpart C Section 15.225(a)(b)(c)	FCC 15.225	PASS
Field Strength of Spurious	FCC CFR Title 47 Part 15 Subpart C Section 15.209 & 15.225(d)	FCC 15.225 & 15.209	PASS
Frequency Tolerance	FCC CFR Title 47 Part 15 Subpart C Section 15.225(e)	FCC 15.225	PASS
Channel Bandwidth	FCC CFR Title 47 Part 15 Subpart C Section 15.215(c)	FCC 15.215	PASS
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C: Section 15.203	FCC 15.203	PASS

2.2. Test Environment

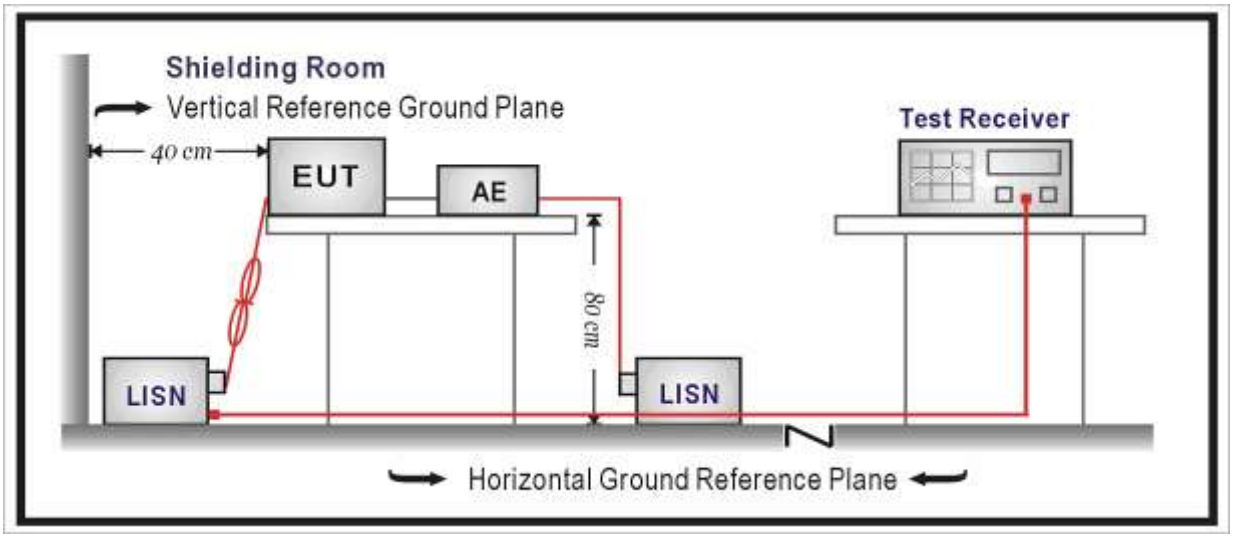
Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

3.1. Test Equipment

Conducted Emission / TR-1					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2018.03.29	2019.03.28
Two-Line V-Network	R&S	ENV216	100043	2018.03.29	2019.03.28
Two-Line V-Network	R&S	ENV216	100044	2017.09.17	2018.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2018.03.02	2019.03.01
50ohm Termination	SHX	TF2	07081401	2017.09.17	2018.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2018.01.04	2019.01.03
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2014 and tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

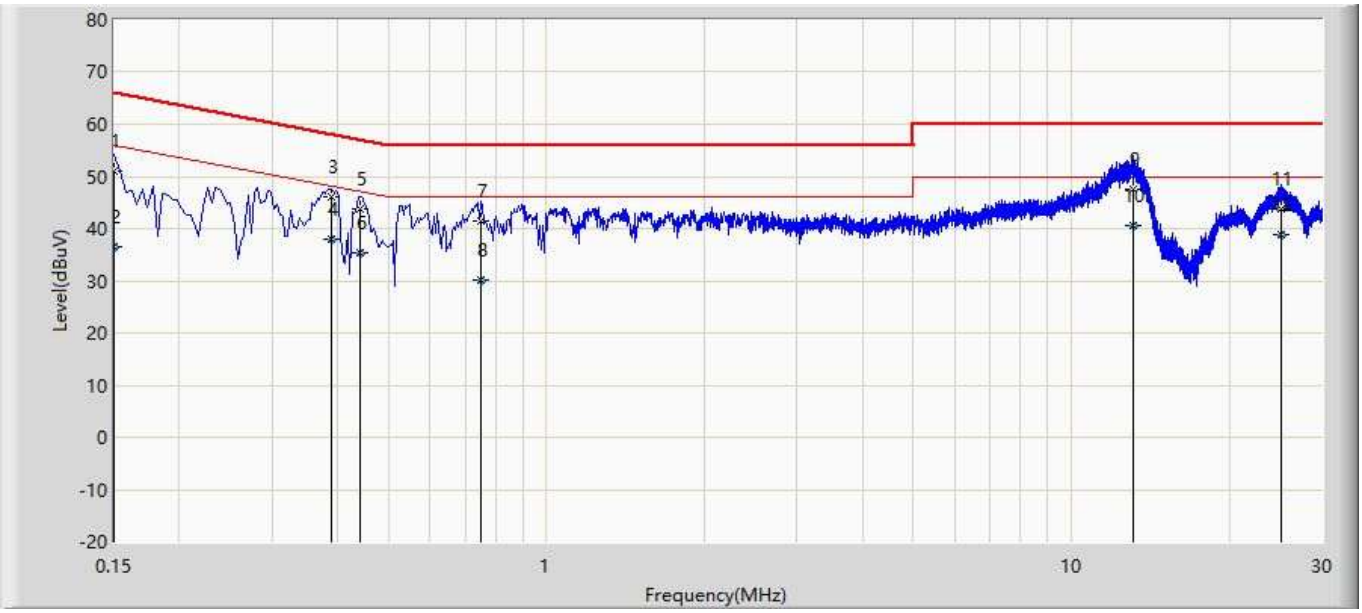
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

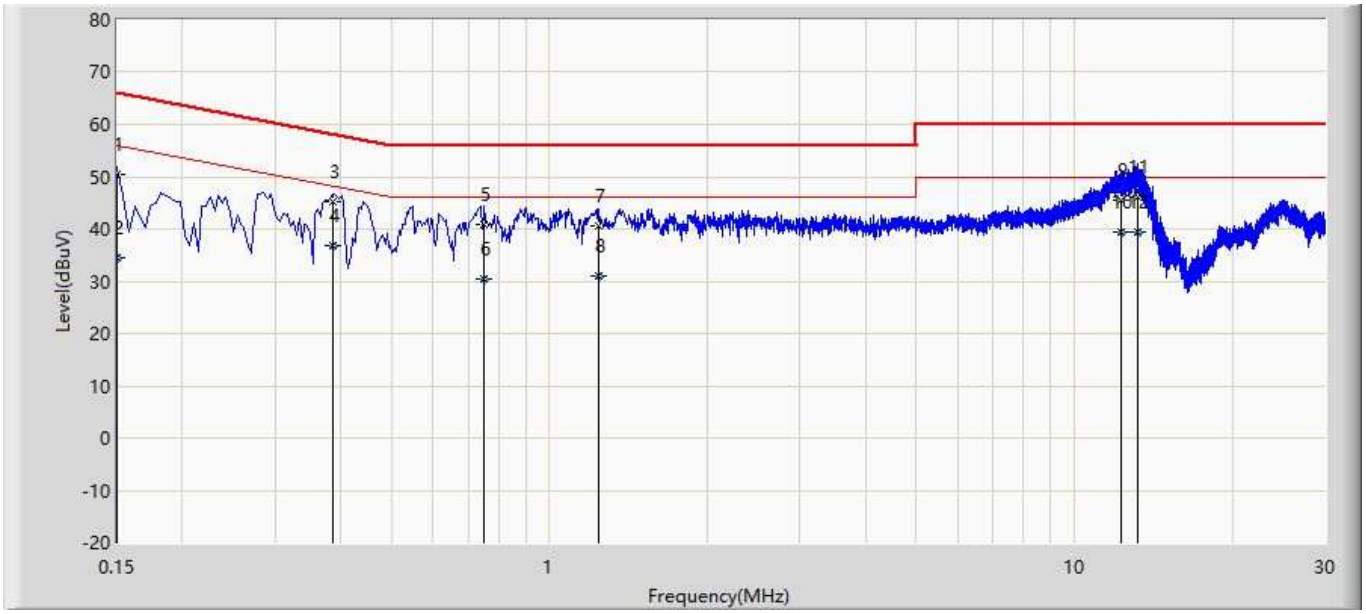
3.6. Test Result

Engineer: Pawn	
Site: TR1	Time: 2018/03/25
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: Barcode Scanner	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 13.56MHz by NFC	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.150	51.114	31.614	-14.886	66.000	9.600	9.900	0.000	QP
2		0.150	36.507	17.007	-19.493	56.000	9.600	9.900	0.000	AV
3		0.390	46.000	26.526	-12.064	58.064	9.590	9.884	0.000	QP
4		0.390	38.058	18.584	-10.006	48.064	9.590	9.884	0.000	AV
5		0.442	43.783	24.312	-13.241	57.024	9.590	9.881	0.000	QP
6		0.442	35.317	15.846	-11.707	47.024	9.590	9.881	0.000	AV
7		0.750	41.395	21.904	-14.605	56.000	9.592	9.900	0.000	QP
8		0.750	30.046	10.555	-15.954	46.000	9.592	9.900	0.000	AV
9		13.122	47.510	27.697	-12.490	60.000	9.646	10.167	0.000	QP
10	*	13.122	40.592	20.779	-9.408	50.000	9.646	10.167	0.000	AV
11		25.090	43.686	23.753	-16.314	60.000	9.594	10.339	0.000	QP
12		25.090	38.820	18.887	-11.180	50.000	9.594	10.339	0.000	AV

Engineer: Pawn	
Site: TR1	Time: 2018/03/25
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: Barcode Scanner	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 13.56MHz by NFC	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.150	50.568	31.088	-15.432	66.000	9.580	9.900	0.000	QP
2		0.150	34.454	14.974	-21.546	56.000	9.580	9.900	0.000	AV
3		0.386	45.220	25.763	-12.930	58.149	9.577	9.880	0.000	QP
4		0.386	36.726	17.269	-11.423	48.149	9.577	9.880	0.000	AV
5		0.750	40.977	21.473	-15.023	56.000	9.605	9.900	0.000	QP
6		0.750	30.290	10.785	-15.710	46.000	9.605	9.900	0.000	AV
7		1.238	40.703	21.177	-15.297	56.000	9.582	9.944	0.000	QP
8		1.238	31.108	11.583	-14.892	46.000	9.582	9.944	0.000	AV
9		12.242	45.478	25.680	-14.522	60.000	9.644	10.154	0.000	QP
10	*	12.242	39.551	19.753	-10.449	50.000	9.644	10.154	0.000	AV
11		13.194	46.206	26.391	-13.794	60.000	9.646	10.169	0.000	QP
12		13.194	39.279	19.464	-10.721	50.000	9.646	10.169	0.000	AV

Note1: " * ", means this data is the worst emission level.

2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

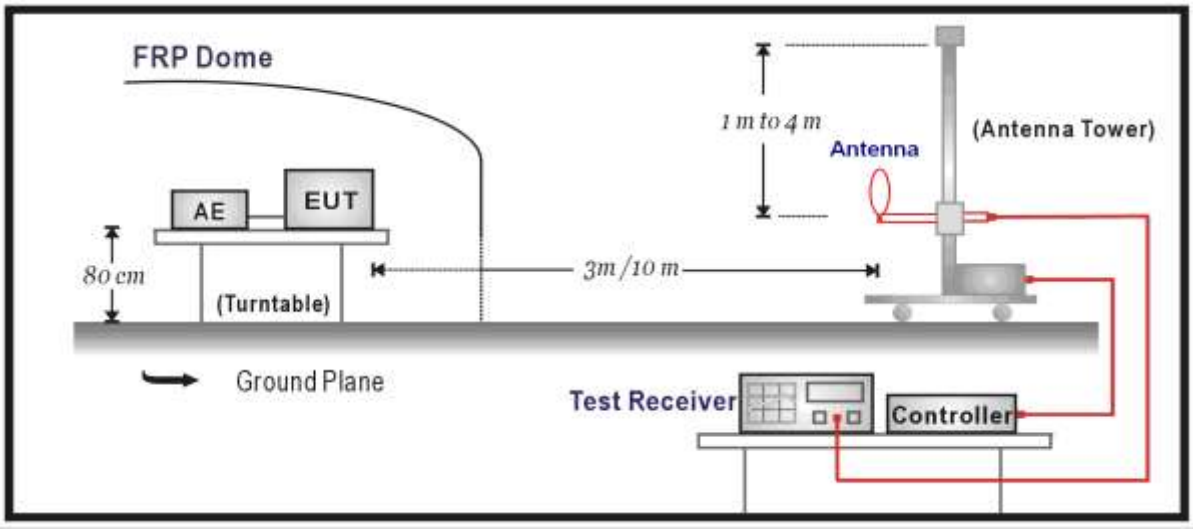
4. In Band Emission

4.1. Test Equipment

Out of Band Emission / AC-2					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2018.03.29	2019.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2017.11.26	2018.11.25
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2017.10.11	2018.10.10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2018.03.02	2019.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2018.01.08	2019.01.07
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

4.2. Test Setup

9kHz~30MHz Test Setup:



4.3. Limit

FCC Part 15.225 & RSS210 Issue8 Section A2.6 (a)(b)(c)		
Frequency (MHz)	Distance (m)	Level (mV/m)
13.553-13.567 MHz	30	15.848
13.410-13.553 MHz and 13.567-13.710 MHz	30	0.334
13.110-13.410 MHz and 13.710-14.010 MHz	30	0.106
outside of the 13.110-14.010 MHz	Table Below	Table Below

Note 1: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 2: E field strength (dBmV/m) = 20 log E field strength (mV/m)

Note 3: Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2). Extrapolation Factor = 20 $\log_{10}(30/3)^2$ = 40dB.

Note 4: Fc= 13.56 MHz.

Field strength of emissions from intentional radiators operated under 15.225(d) and 15.209(a) shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (μ V/m)	Field strength of spurious emissions (μ V/m)
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

(1) The tighter limits apply at the band edges.

(2) Measurements were performed at 10m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2). Extrapolation Factor = 20 $\log_{10}(30/10)^2$ = 20dB.

(3) All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

4.4. Test Procedure

The EUT was setup according to ANSI C63.4 and tested according to ANSI C63.10 for compliance to FCC 47CFR 15.225 requirements.
The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 10 meters.
The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4 on radiated measurement.

4.5. Uncertainty

The measurement uncertainty is defined as ± 3.80 dB

4.6. Test Result

Product	Barcode Scanner		
Test Item	In Band Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2018/04/02	Test Site	AC-2

Frequency (MHz)	Measure Level (dBµV/m)	Loop Ant. Pol. (H/V)	Correction factor (dB)	Reading Level (dBµV/m)	Distance factor (dB)	Corrected Measure level (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)
13.56	23.514	H	-29.406	52.920	-20	3.514	84.00	-80.486
13.56	19.653	V	-29.406	49.059	-20	-0.347	84.00	-84.347
13.553	1.242	H	-29.406	30.648	-20	-18.758	50.50	-69.258
13.567	0.885	H	-29.406	30.291	-20	-19.115	50.50	-69.615
13.41	0.467	H	-29.414	29.881	-20	-19.533	40.50	-60.033
13.71	0.531	H	-29.392	29.923	-20	-19.469	40.50	-59.969

Note1: Antenna Test Distance at 10 meters.

Note2: Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2). Extrapolation Factor = 20 $\log_{10}(30/10)^2$ = 20dB.

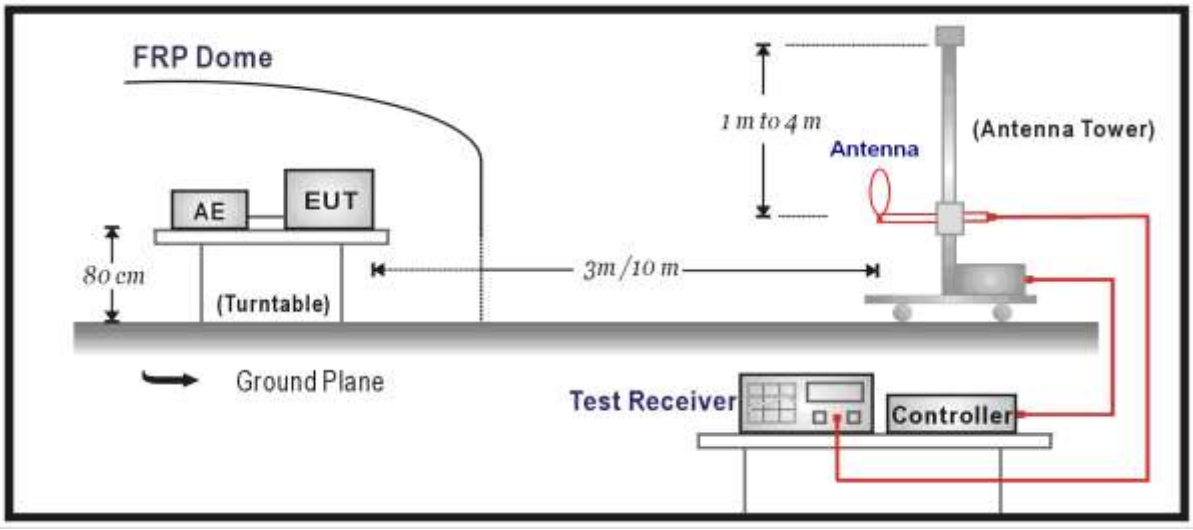
5. Radiated Emission

5.1. Test Equipment

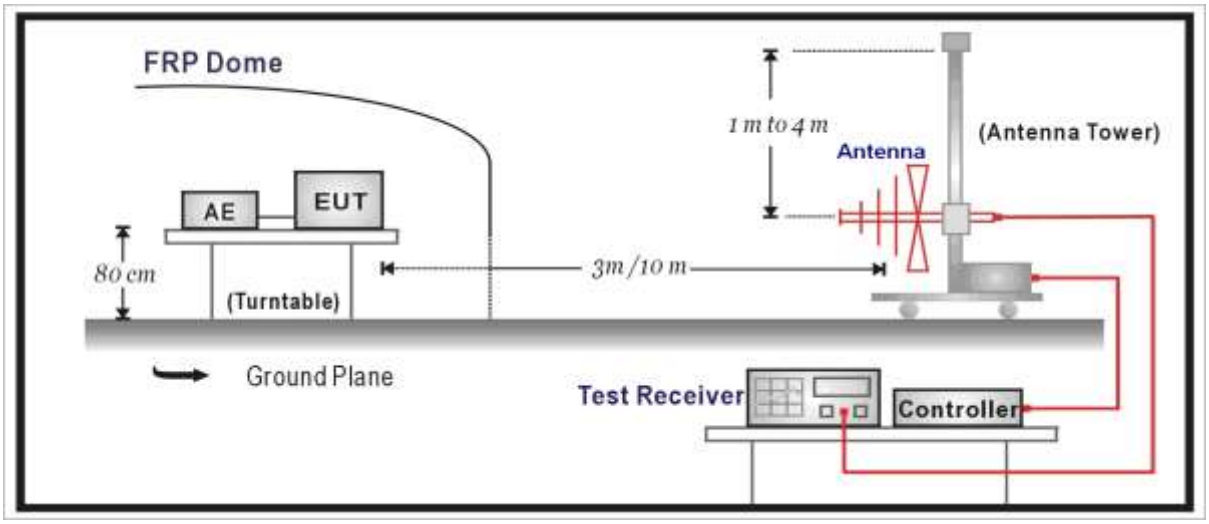
Out of Band Emission / AC-2					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2018.03.29	2019.03.28
Loop Antenna	R&S	HFH2-Z2	833799/003	2017.11.26	2018.11.25
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2017.10.11	2018.10.10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2018.03.02	2019.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2018.01.08	2019.01.07
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

5.2. Test Setup

9kHz~30MHz Test Setup:



30MHz~1GHz Test Setup:



5.3. Limit

Field strength of emissions from intentional radiators operated under 15.225(d) and 15.209(a) shall not exceed the following:

FCC Part 15.225(d) and 15.209(a)		
Fundamental frequency (MHz)	Field strength of fundamental (μ V/m)	Field strength of spurious emissions (μ V/m)
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

(4) The tighter limits apply at the band edges.

(5) Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)(2). Extrapolation Factor = 20 $\log_{10}(30/3)^2$ = 40dB for example.

(6) All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions (X front, Y side, Z top) and the position with the highest emission level was recorded.

5.4. Test Procedure

The EUT was setup according to ANSI C63.4 and tested according to ANSI C63.10 for compliance to FCC 47CFR 15.225 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4 on radiated measurement.

The frequency range from 9kHz to 10th harmonic is checked.

5.5. Uncertainty

The measurement uncertainty is defined as ± 3.80 dB

5.6. Test Result

Product	Barcode Scanner		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2018/04/02	Test Site	AC-2

Frequency (MHz)	Measure Level (dBµV/m)	Loop Ant. Pol. (H/V)	Correction factor (dB)	Reading Level (dBµV/m)	Distance factor (dB)	Corrected Measure level (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)
0.078	8.823	H	-28.591	37.414	-20	-11.177	69.154	-80.331
0.094	2.599	H	-28.611	31.210	-20	-17.401	68.346	-85.747
27.12	-8.123	H	-29.341	21.218	-20	-28.123	48.000	-76.123
0.078	8.753	V	-28.591	37.344	-20	-11.247	69.154	-80.401
3.963	-0.497	V	-29.832	29.335	-20	-20.497	52.168	-72.665
27.12	6.198	V	-29.341	35.539	-20	-13.802	48.000	-61.802
197.931	41.642	H	17.679	23.963	0	41.642	43.500	-1.858
296.992	41.968	H	20.297	21.671	0	41.968	46.000	-4.032
395.932	40.554	H	25.091	15.463	0	40.554	46.000	-5.446
197.931	37.231	V	22.092	15.139	0	37.231	43.500	-6.269
296.992	34.573	V	23.411	11.162	0	34.573	46.000	-11.427
947.135	41.122	V	34.791	6.331	0	41.122	46.000	-4.878

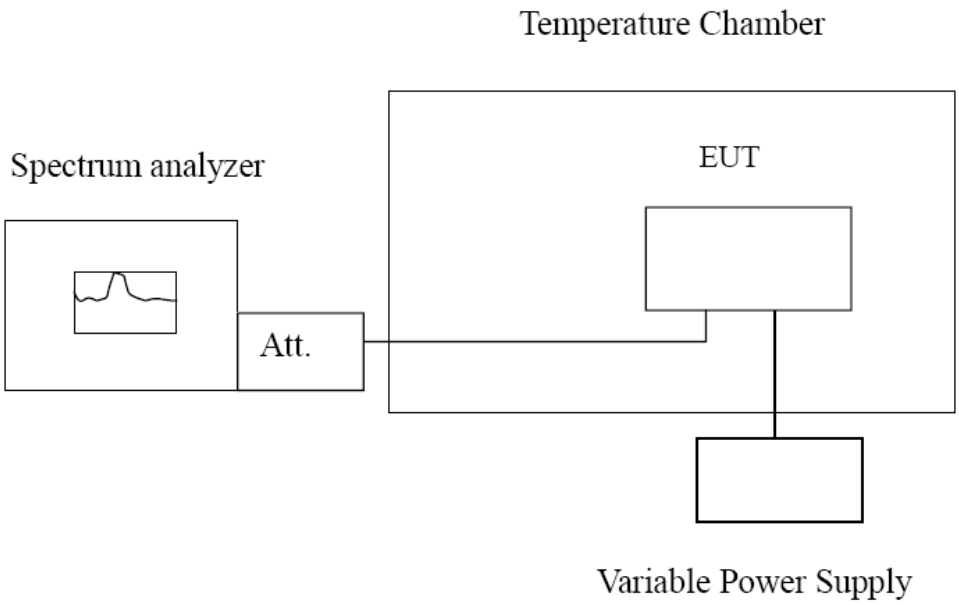
Test Result	Pass

6. Frequency Tolerance

6.1. Test Equipment

Frequency Tolerance / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2018.02.04	2019.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2017.04.09	2018.04.08
MXA Signal Anlyzer	Keysight	N9020A	MY56060147	2017.04.09	2018.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2017.04.10	2018.04.09
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

6.2. Test Setup



6.3. Limit

The frequency tolerance of the carrier signal shall be maintained within ±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.

6.4. Test Procedure

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

6.5. Uncertainty

The measurement uncertainty is defined as ± 10 Hz

6.6. Test Result

Product	:	Barcode Scanner
Test Item	:	Frequency Stability
Test Site	:	TR-7
Test Mode	:	Mode 1: Transmit

Frequency Stability under Temperature

Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)
-20	13.56	45	3.319	±100
-10	13.56	-28	-2.065	±100
0	13.56	10	0.737	±100
10	13.56	-41	-3.024	±100
20	13.56	5	0.369	±100
30	13.56	-5	-0.369	±100
40	13.56	-14	-1.032	±100
50	13.56	-48	-3.540	±100

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Deviation (ppm)	Limit (Hz)
3.23	13.56	8	0.590	±100
3.8	13.56	-43	-3.171	±100
4.37	13.56	-44	-3.245	±100

Test Result	Pass

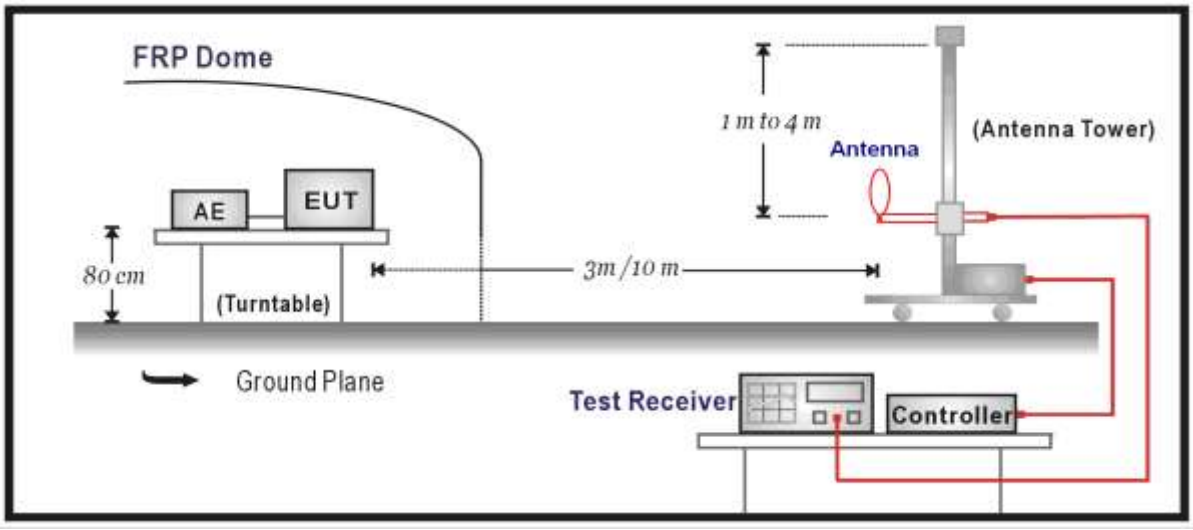
7. 20dB Occupied Bandwidth

7.1. Test Equipment

Occupied Bandwidth / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2018.02.04	2019.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2017.04.09	2018.04.08
MXA Signal Anlyzer	Keysight	N9020A	MY56060147	2017.04.09	2018.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2017.04.10	2018.04.09
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

7.2. Test Setup

9kHz~30MHz Test Setup:



7.3. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, 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.
The operating frequency band is 13.553MHz~13.567MHz.

7.4. Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

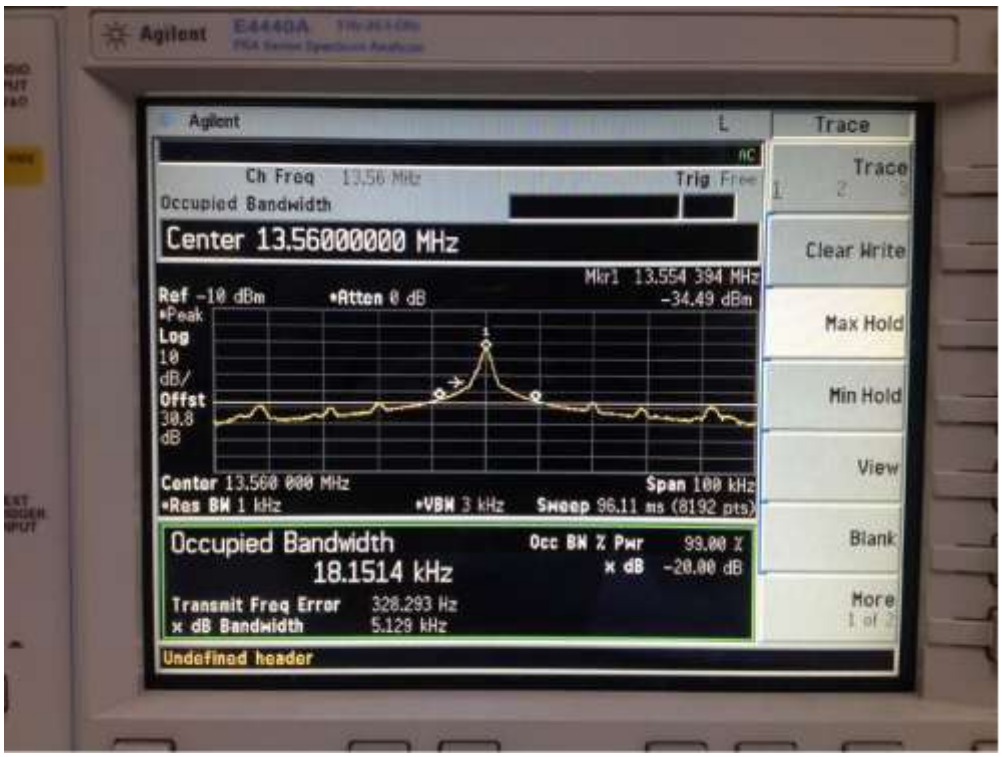
7.5. Uncertainty

The measurement uncertainty is defined as ± 10 Hz

7.6. Test Result

Product	Barcode Scanner		
Test Item	20dB Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2018/04/02	Test Site	AC-2

Frequency (MHz)	20dB Bandwidth (kHz)	20dBc point (Low) (MHz)	20dBc point (High) (MHz)	Frequency Range (MHz)
13.56	5.129	13.557	13.563	13.553 ~ 13.567



Test Result	Pass

8. 99% Occupied Bandwidth

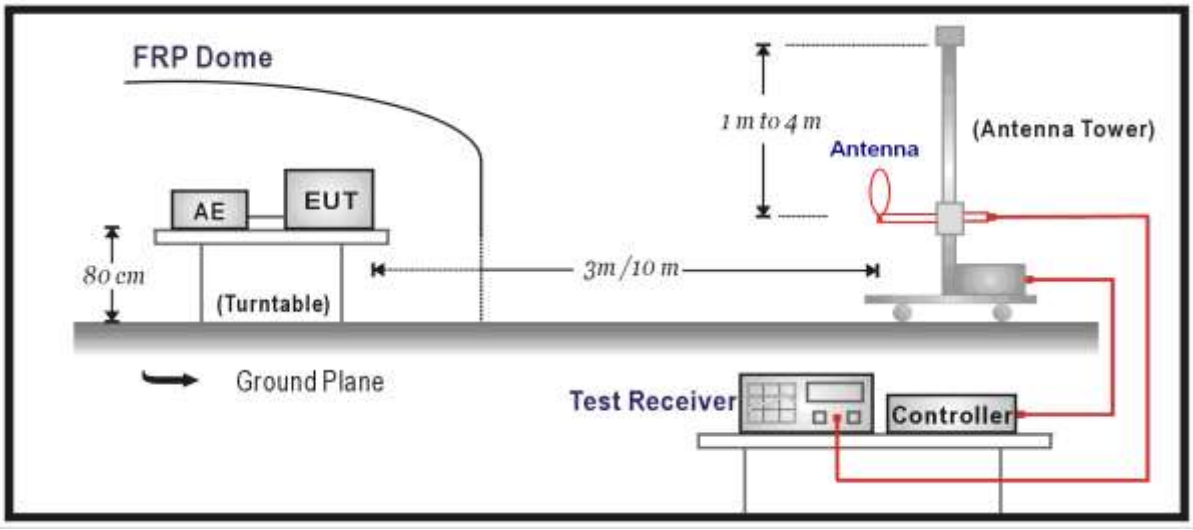
8.1. Test Equipment

Occupied Bandwidth / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2016.03.28
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2016.03.10
Loop Antenna	R&S	HFH2-Z2	833799/003	2016.11.25
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2016.10.10
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2016.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2016.01.07

8.2. Test Setup

9kHz~30MHz Test Setup:



8.3. Limit

N/A

8.4. Test Procedure

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth. When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured. A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

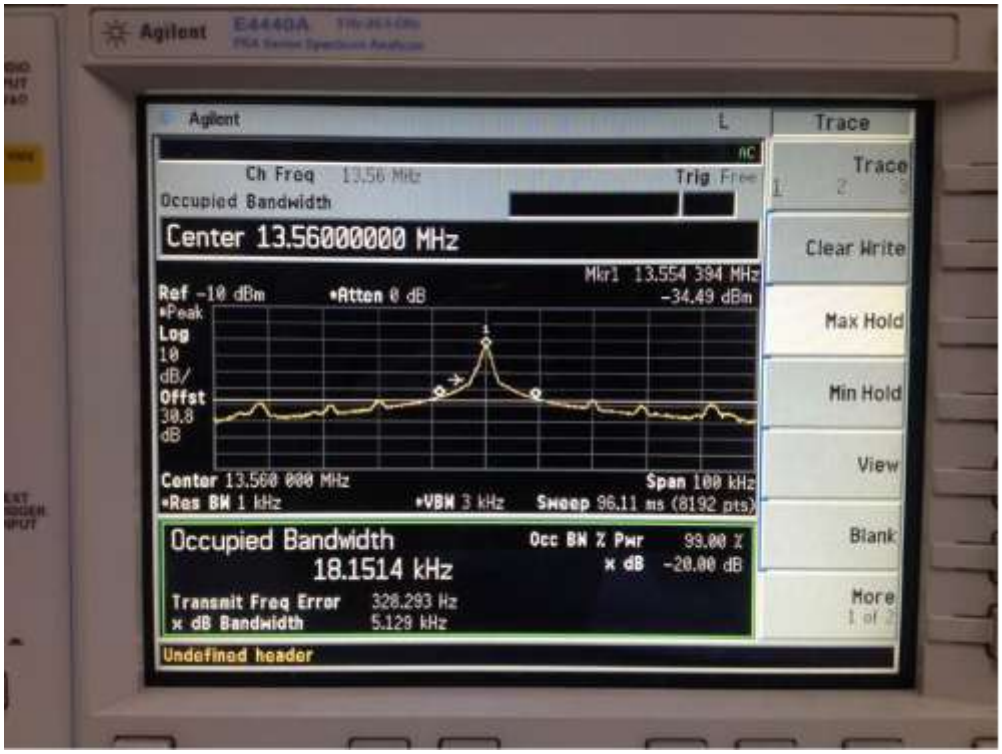
8.5. Uncertainty

The measurement uncertainty is defined as ± 10 Hz

8.6. Test Result

Product	Barcode Scanner		
Test Item	99% Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2018/04/02	Test Site	AC-2

Frequency (MHz)	99% Occupied Bandwidth (kHz)
13.56	18.1514



9. Antenna Requirement

9.1. Requirement

Antenna Requirement Limit
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.

9.2. Result

Antenna Connector Construction	
☒	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☐	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document “Internal Photograph” to show the antenna connector.	

The End