




TEST REPORT

Report No. : **CHTEW20040139** Report Verification : 

Project No...... : **SHT1912063001EW**

FCC ID..... : **2AJ9T-HBLZM**

Applicant's name..... : **ZKTECO CO., LTD.**

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Manufacturer..... : ZKTECO CO., LTD.

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Test item description : **Hybrid Biometric Lock**

Trade Mark : -

Model/Type reference..... : HBL100Z

Listed Model(s) : HBL200Z

Standard : **FCC CFR Title 47 Part 15 Subpart C Section 15.249**


Date of receipt of test sample..... : Dec.20, 2019

Date of testing..... : Dec.20, 2019- Apr.17, 2020

Date of issue..... : Apr.20, 2020

Result..... : **PASS**

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Approved by
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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.249](#): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2020-04-20	Original

2 . TEST DESCRIPTION

Report clause	Test Item	Standard Requirement	Result	Test Engineer
5.1	Antenna Requirement	15.203	PASS	N/A
5.2	AC Conducted Emission	15.207	PASS	Greg WU
5.3	20dB Bandwidth	15.215/15.249	PASS	Jiongsheng Feng
5.4	Field strength of the Fundamental signal	15.249(a)	PASS	Jiongsheng Feng
5.5	Radiated Band Edge Emission	15.249(a)15.205/15.209	PASS	Pan Xie
5.6	Radiated Spurious Emission	15.249(d)15.205/15.209	PASS	Pan Xie

Note:

- The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

Applicant:	ZKTECO CO., LTD.
Address:	No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728
Manufacturer:	ZKTECO CO., LTD.
Address:	No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

3.2. Product Description

Name of EUT:	Hybrid Biometric Lock
Trade Mark:	-
Model No.:	HBL100Z
Listed Model(s):	HBL200Z
Power supply:	DC 7.4V
Hardware Version:	V1.5
Software Version:	V 19.0919.1702

3.3. Radio Specification Description

Operation frequency:	2405~2480MHz
Channel number:	16
Modulation Type:	FSK
Antenna type:	Monopole antenna
Antenna gain:	2dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below gray bottom.

Channel	Frequency (MHz)
CH _L	2405
CH _M	2440
CH _H	2480

4.2. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with large package sizes transmission. During all testing, the product is powered by full charged batterys.
For Radiated spurious emissions test item:
The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data recorded in the report. During all testing, the product is powered by full charged batterys.

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?					
✓ No					
Item	Equipement	Trade Name	Model No.	FCC ID	Power cord
1					
2					

4.4. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.5. Measurement uncertainty

Test Item	Measurement Uncertainty
AC Conducted Emission (150kHz~30MHz)	3.02 dB
Radiated Emission (30MHz~1000MHz)	4.90 dB
Radiated Emissions (1GHz~25GHz)	4.96 dB
Peak Output Power	0.51 dB
Power Spectral Density	0.51 dB
Conducted Spurious Emission	0.51 dB
6dB Bandwidth	70 Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.6. Equipment Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLEX 142	EF-NM-BNCM-2M	2019/10/23	2020/10/22
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-6th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2020/04/05	2023/04/04
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2019/08/21	2020/08/20
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX 104	501184/4	2019/05/27	2020/05/26
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2021/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
●	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	25841	2018/10/11	2021/10/10
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/10
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2019/05/23	2020/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2019/05/10	2020/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2019/05/10	2020/05/09
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2019/10/26	2020/10/25
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25
○	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

Requirement

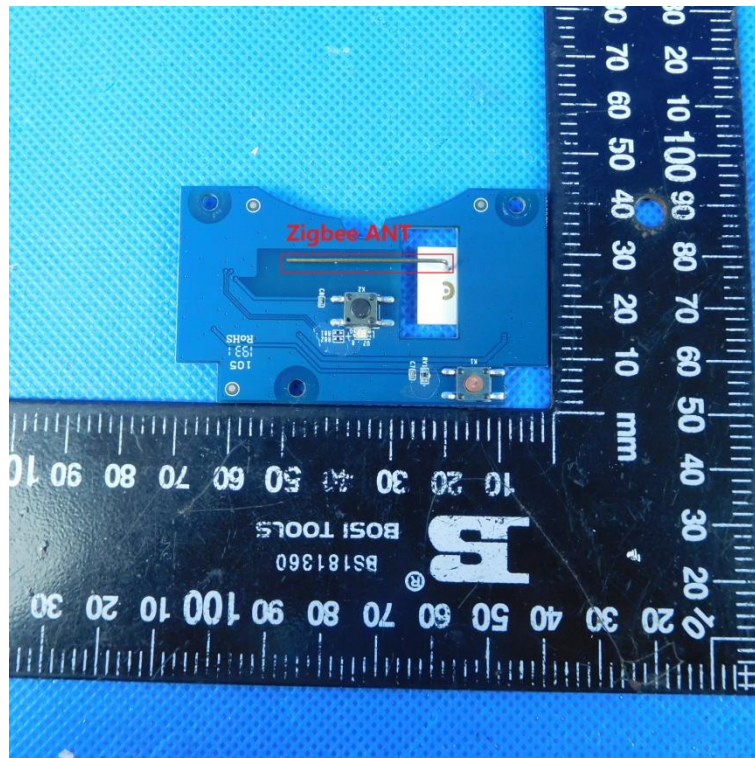
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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, 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.

TEST RESULTS

Passed **Not Applicable**

The antenna type is a monopole antenna, the directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. AC Conducted Emissions

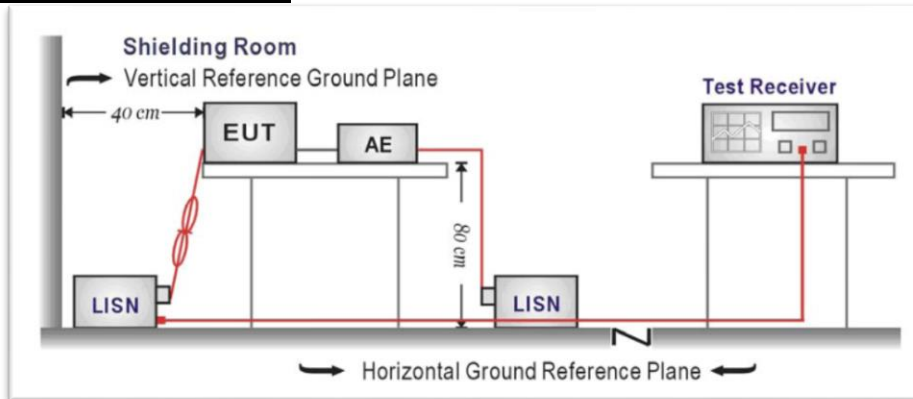
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

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

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 10 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 10 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
4. 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)
5. 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.
6. 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.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

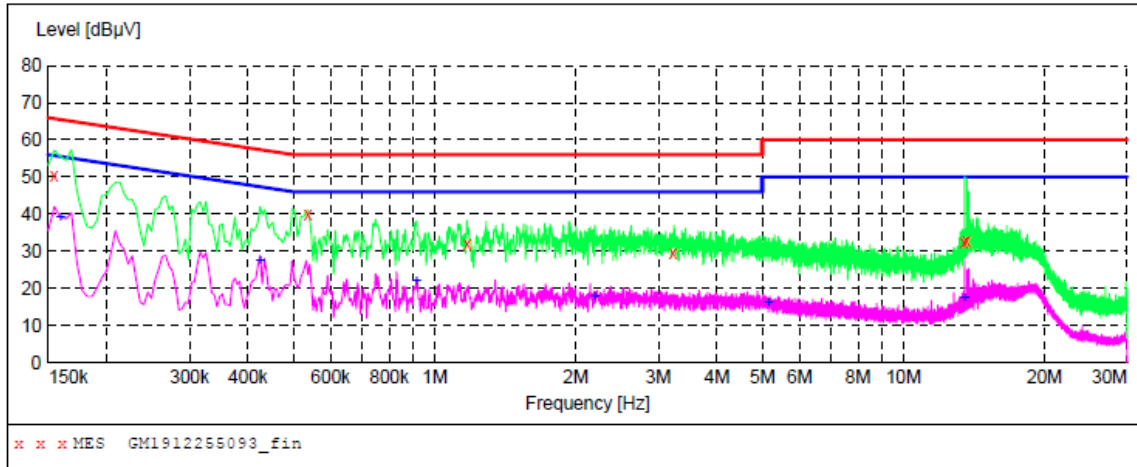
Please refer to the clause 4.2

TEST RESULTS

Passed Not Applicable

Test Line:

L



MEASUREMENT RESULT: "GM1912255093_fin"

12/25/2019 7:32PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	50.50	10.1	66	15.3	QP	L1	GND
0.537000	40.00	10.1	56	16.0	QP	L1	GND
1.176000	32.20	10.1	56	23.8	QP	L1	GND
3.232500	29.30	10.1	56	26.7	QP	L1	GND
13.470000	32.60	10.2	60	27.4	QP	L1	GND
13.650000	32.70	10.2	60	27.3	QP	L1	GND

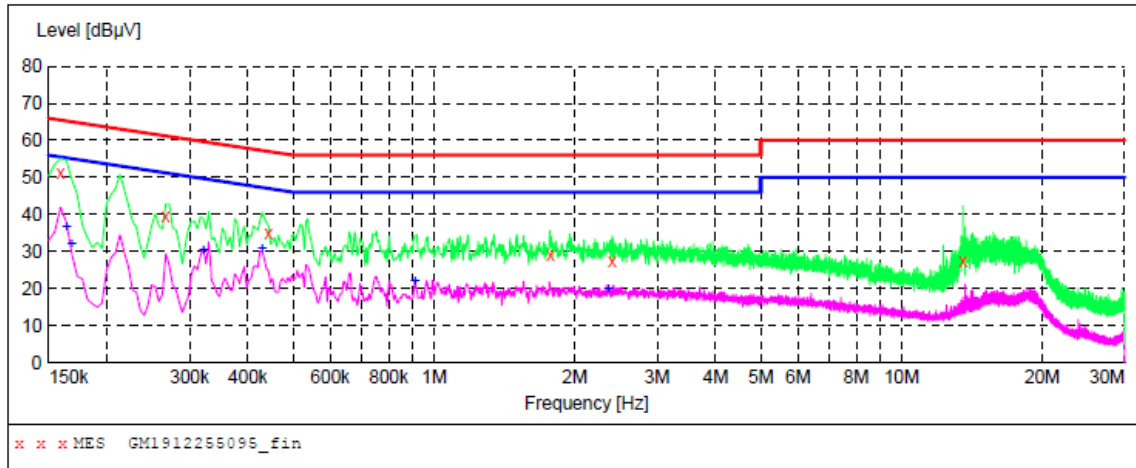
MEASUREMENT RESULT: "GM1912255093_fin2"

12/25/2019 7:32PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	39.10	10.1	56	16.4	AV	L1	GND
0.424500	27.20	10.1	47	20.2	AV	L1	GND
0.915000	21.80	10.1	46	24.2	AV	L1	GND
2.193000	17.90	10.1	46	28.1	AV	L1	GND
5.145000	16.00	10.2	50	34.0	AV	L1	GND
13.488000	17.40	10.2	50	32.6	AV	L1	GND

Test Line:

N



MEASUREMENT RESULT: "GM1912255095_fin"

12/25/2019 7:39PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	51.30	10.1	66	14.2	QP	N	GND
0.267000	39.50	10.1	61	21.7	QP	N	GND
0.442500	35.00	10.1	57	22.0	QP	N	GND
1.774500	29.10	10.1	56	26.9	QP	N	GND
2.409000	27.60	10.1	56	28.4	QP	N	GND
13.528500	27.40	10.2	60	32.6	QP	N	GND

MEASUREMENT RESULT: "GM1912255095_fin2"

12/25/2019 7:39PM

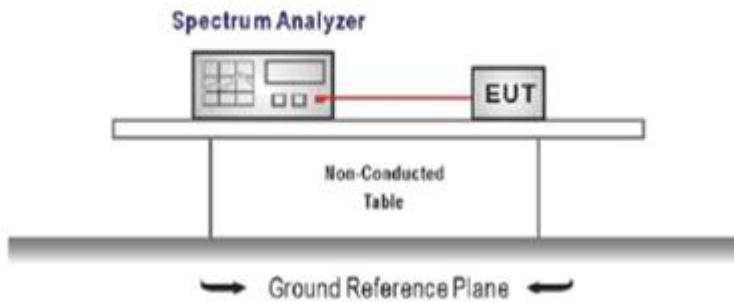
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	36.40	10.1	55	18.9	AV	N	GND
0.168000	31.90	10.1	55	23.2	AV	N	GND
0.321000	30.50	10.1	50	19.2	AV	N	GND
0.429000	30.60	10.1	47	16.7	AV	N	GND
0.910500	21.80	10.1	46	24.2	AV	N	GND
2.359500	19.80	10.1	46	26.2	AV	N	GND

5.3. 20 dB bandwidth

Limit

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
 Center Frequency = channel center frequency
 Span= approximately 2 to 3 times the 20 dB bandwidth
 RBW = 100 kHz, VBW ≥ 3 × RBW
 Sweep time= auto couple
 Detector = Peak
 Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission, and record the pertinent measurements.

TEST MODE:

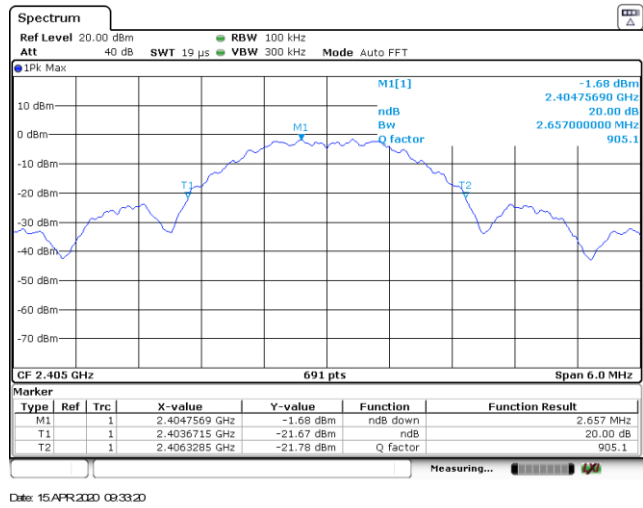
Please refer to the clause 4.2

TEST RESULTS

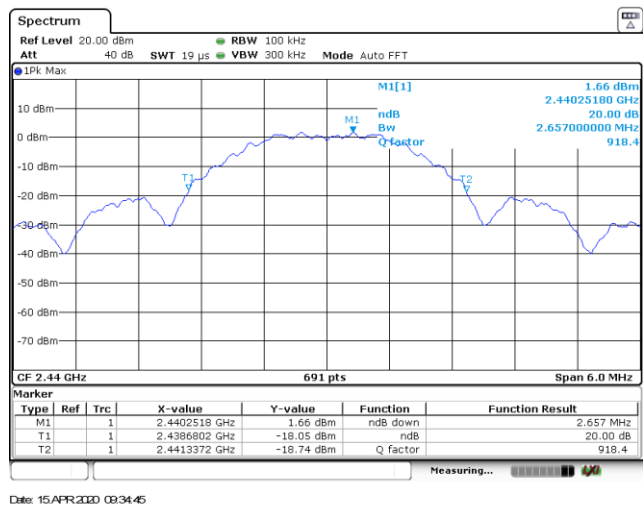
Passed **Not Applicable**

Test Channel	20dB Bandwidth (MHz)	Limit (MHz)	Result
CH _L	2.657	-	Pass
CH _M	2.657	-	Pass
CH _H	2.657	-	Pass

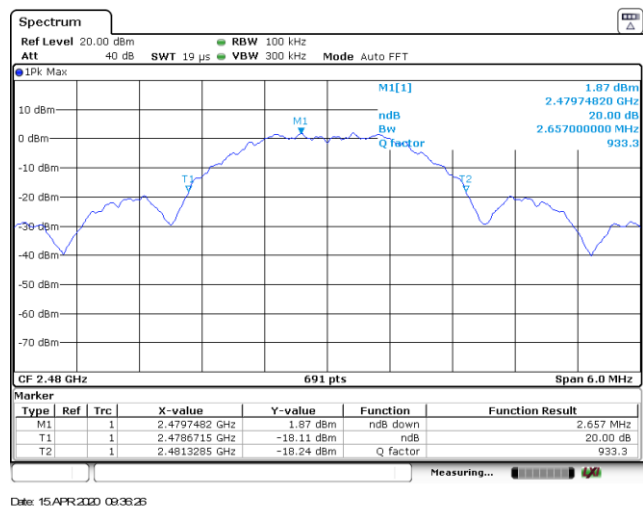
CH_L



CH_M



CH_H



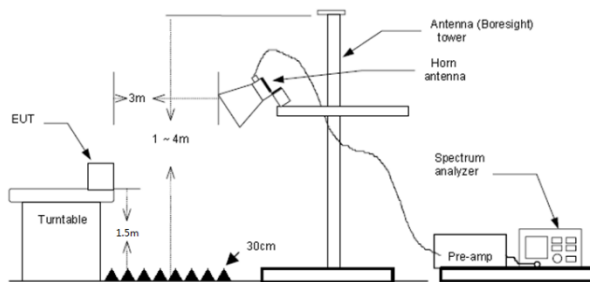
5.4. Radiated field strength of the fundamental signal

LIMIT

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50 (94dBuV/m @3m)	500 (54dBuV/m @3m)
2400-2483.5 MHz	50 (94dBuV/m @3m)	500 (54dBuV/m @3m)
5725-5875 MHz	50 (94dBuV/m @3m)	500 (54dBuV/m @3m)
24.0-24.25 GHz	250 (108dBuV/m @3m)	2500 (68dBuV/m @3m)

Frequencies above 1000 MHz, the field strength limits are based on average limits

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. 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 C63.10:2013 on radiated measurement.
5. Use the following spectrum analyzer settings:
 RBW=3MHz, VBW=3MHz Peak detector for Peak value.
 RBW=3MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 4.2

TEST RESULTS

Passed Not Applicable

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level

CH_L

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2404.451	38.51	45.10	83.61	114.00	30.39	Horizontal	PK
2	2404.451	36.16	45.10	81.26	94.00	12.74	Horizontal	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2404.503	38.86	45.10	83.96	114.00	30.04	Vertical	PK
2	2404.503	36.49	45.10	81.59	94.00	12.41	Vertical	AV

CH_M

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2440.486	46.57	45.48	92.05	114.00	21.95	Horizontal	PK
2	2440.486	44.04	45.48	89.52	94.00	4.48	Horizontal	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2440.483	47.47	45.48	92.95	114.00	21.05	Vertical	PK
2	2440.483	45.13	45.48	90.61	94.00	3.39	Vertical	AV

CH_H

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2480.443	50.76	45.90	96.66	114.00	17.34	Horizontal	PK
2	2480.443	46.31	45.90	92.21	94.00	1.79	Horizontal	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
1	2480.406	44.49	45.90	92.39	114.00	21.61	Vertical	PK
2	2480.406	40.09	45.90	85.99	94.00	8.01	Vertical	AV

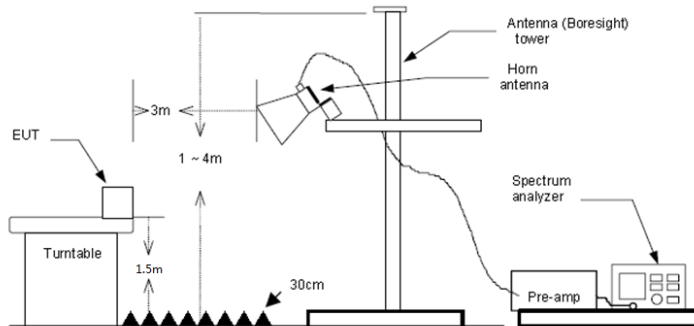
5.5. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. 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 C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall be wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

 - VBW=10Hz, When duty cycle is no less than 98 percent
 - VBW≥1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting .

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

Passed Not Applicable

Note:

- 3) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 4) Margin = Limit – Level
- 5) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

CHL

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2310.000	44.20	-2.34	41.86	74.00	32.14	Horizontal	PK
2	2390.003	44.63	-2.41	42.22	74.00	31.78	Horizontal	PK

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2310.000	34.25	-2.34	31.91	54.00	22.09	Horizontal	AV
2	2390.003	35.12	-2.41	32.71	54.00	21.29	Horizontal	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2310.000	44.79	-2.34	42.45	74.00	31.55	Vertical	PK
2	2390.003	44.00	-2.41	41.59	74.00	32.41	Vertical	PK

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2310.000	34.34	-2.34	32.00	54.00	22.00	Vertical	AV
2	2390.003	34.68	-2.41	32.27	54.00	21.73	Vertical	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
3	2400.090	23.15	35.46	58.61	74.00	15.39	Horizontal	PK
3	2400.090	13.49	35.46	48.95	54.00	5.05	Horizontal	AV

Suspected Data List

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
3	2400.090	24.15	35.46	59.61	74.00	14.39	Vertical	PK
3	2400.090	13.94	35.46	49.40	54.00	4.60	Vertical	AV

CH_H

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2483.501	62.28	-2.15	60.13	74.00	13.87	Horizontal	PK
2	2500.000	43.59	-2.10	41.49	74.00	32.51	Horizontal	PK

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2483.501	50.48	-2.15	48.33	54.00	5.67	Horizontal	AV
2	2500.000	34.62	-2.10	32.52	54.00	21.48	Horizontal	AV

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2483.501	58.89	-2.15	56.74	74.00	17.26	Vertical	PK
2	2500.000	44.24	-2.10	42.14	74.00	31.86	Vertical	PK

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	2483.501	48.61	-2.15	46.46	54.00	7.54	Vertical	AV
2	2500.000	34.67	-2.10	32.57	54.00	21.43	Vertical	AV

5.6. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

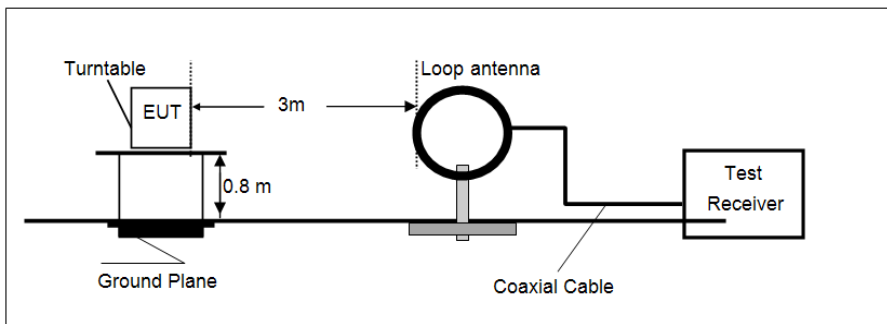
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

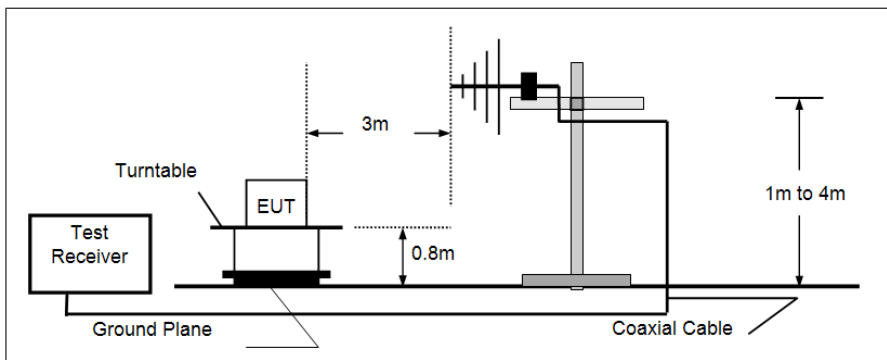
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

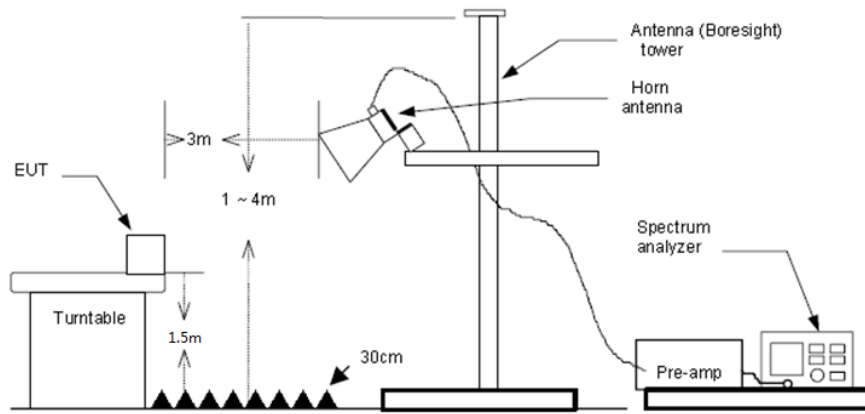
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:
 - RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
 - If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
 - For average measurement:
 - VBW=10Hz, When duty cycle is no less than 98 percent

VBW \geq 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting.

TEST MODE:

Please refer to the clause 4.2

TEST RESULT

Passed **Not Applicable**

Note:

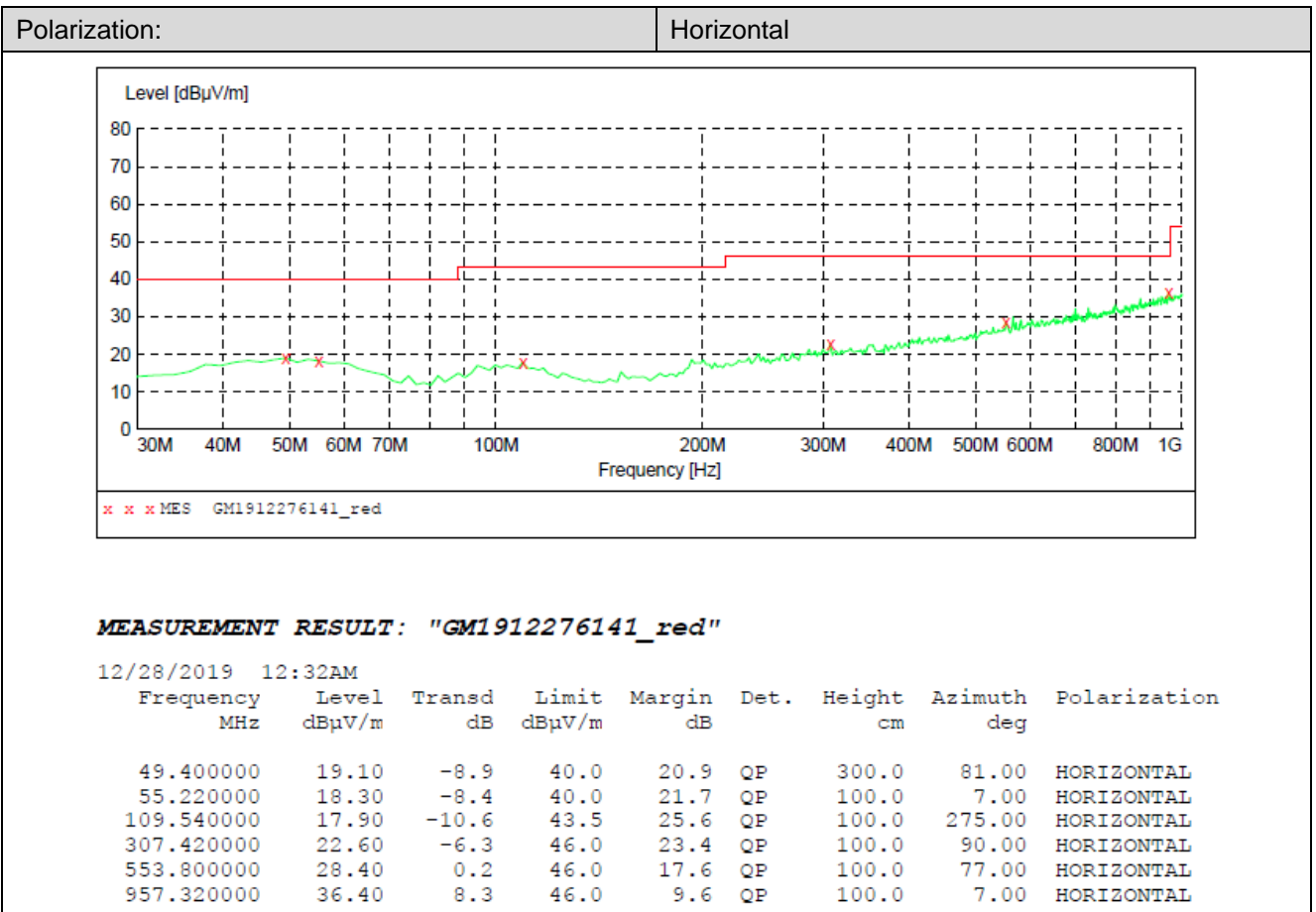
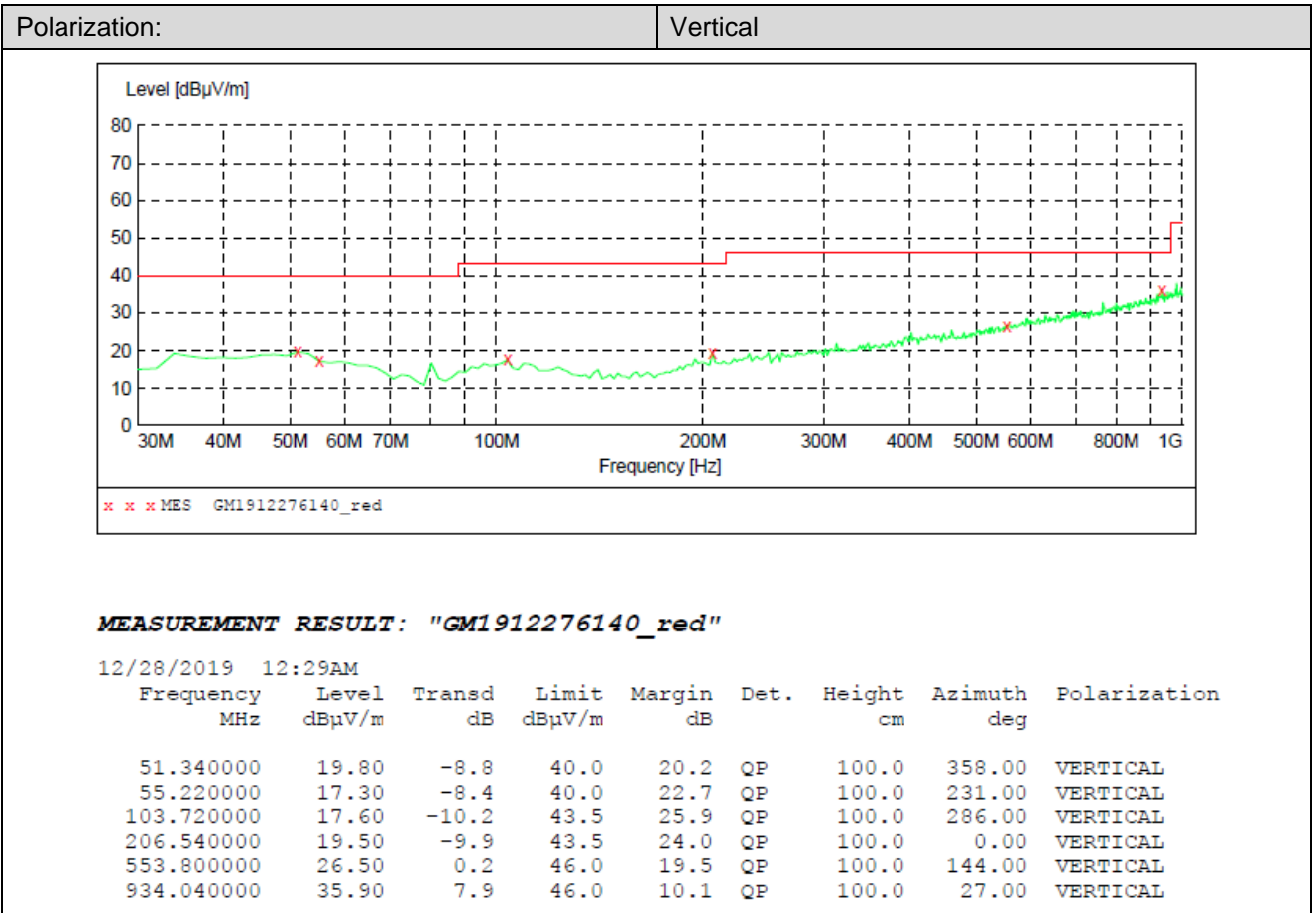
- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit – Level
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

TEST DATA FOR 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

TEST DATA FOR 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH_H which it was worst case, so only show the worst case's data on this report.



TEST DATA FOR 1 GHz ~ 25 GHz**CH_L**

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	1171.843	34.19	-6.13	28.06	74.00	45.94	Horizontal	PK
2	1177.718	24.11	-6.07	18.04	54.00	35.96	Horizontal	AV
3	2998.968	34.12	-0.11	34.01	74.00	39.99	Horizontal	PK
4	3173.750	22.37	0.70	23.07	54.00	30.93	Horizontal	AV
5	4808.468	41.06	7.06	48.12	54.00	5.88	Horizontal	AV
6	4811.406	48.20	7.06	55.26	74.00	18.74	Horizontal	PK
7	7217.218	34.12	15.00	49.12	74.00	24.88	Horizontal	PK
8	7217.218	25.94	15.00	40.94	54.00	13.06	Horizontal	AV

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	1233.531	24.01	-5.74	18.27	54.00	35.73	Vertical	AV
2	1243.812	34.02	-5.72	28.30	74.00	45.70	Vertical	PK
3	3144.375	23.03	0.55	23.58	54.00	30.42	Vertical	AV
4	3144.375	34.35	0.55	34.90	74.00	39.10	Vertical	PK
5	4808.468	35.12	7.06	42.18	54.00	11.82	Vertical	AV
6	4811.406	43.06	7.06	50.12	74.00	23.88	Vertical	PK
7	7215.750	33.38	15.00	48.38	74.00	25.62	Vertical	PK
8	7217.218	23.62	15.00	38.62	54.00	15.38	Vertical	AV

CH_M

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	1196.812	33.83	-5.86	27.97	74.00	46.03	Horizontal	PK
2	1242.343	23.52	-5.72	17.80	54.00	36.20	Horizontal	AV
3	3173.750	22.26	0.70	22.96	54.00	31.04	Horizontal	AV
4	3179.625	32.05	0.73	32.78	74.00	41.22	Horizontal	PK
5	4878.968	42.21	7.15	49.36	54.00	4.64	Horizontal	AV
6	4880.437	50.78	7.15	57.93	74.00	16.07	Horizontal	PK
7	7321.500	30.66	15.12	45.78	54.00	8.22	Horizontal	AV
8	7321.500	37.22	15.12	52.34	74.00	21.66	Horizontal	PK

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	1171.843	34.08	-6.13	27.95	74.00	46.05	Vertical	PK
2	1226.187	23.88	-5.76	18.12	54.00	35.88	Vertical	AV
3	3132.625	33.38	0.49	33.87	74.00	40.13	Vertical	PK
4	3185.500	22.32	0.76	23.08	54.00	30.92	Vertical	AV
5	4878.968	39.10	7.15	46.25	54.00	7.75	Vertical	AV
6	4880.437	46.02	7.15	53.17	74.00	20.83	Vertical	PK
7	7321.500	29.52	15.12	44.64	54.00	9.36	Vertical	AV
8	7321.500	35.80	15.12	50.92	74.00	23.08	Vertical	PK

CH_H

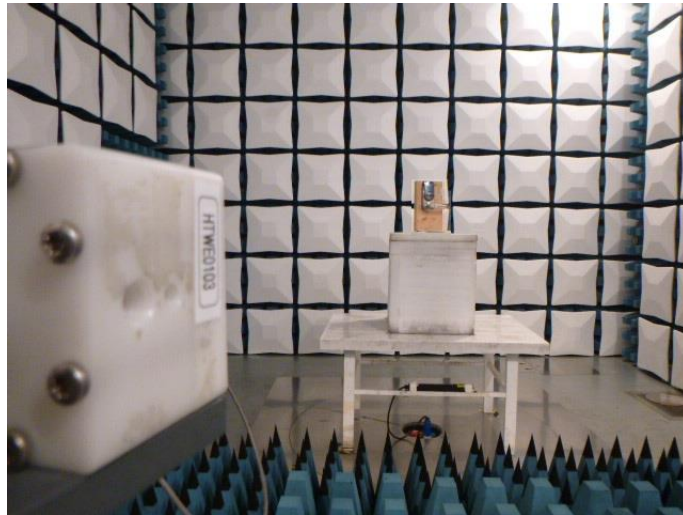
Suspected Data List								
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1	1176.250	23.89	-6.08	17.81	54.00	36.19	Horizontal	AV
2	1248.218	33.98	-5.70	28.28	74.00	45.72	Horizontal	PK
3	3163.468	22.43	0.65	23.08	54.00	30.92	Horizontal	AV
4	3176.687	31.98	0.72	32.70	74.00	41.30	Horizontal	PK
5	4958.281	50.29	7.57	57.86	74.00	16.14	Horizontal	PK
6	4959.750	41.02	7.58	48.60	54.00	5.40	Horizontal	AV
7	7441.937	34.71	15.39	50.10	54.00	3.90	Horizontal	AV
8	7441.937	41.54	15.39	56.93	74.00	17.07	Horizontal	PK

Suspected Data List								
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Polarity	Detector
1	1118.968	34.89	-6.69	28.20	74.00	45.80	Vertical	PK
2	1190.937	24.00	-5.93	18.07	54.00	35.93	Vertical	AV
3	2987.218	23.74	-0.05	23.69	54.00	30.31	Vertical	AV
4	3128.218	32.99	0.47	33.46	74.00	40.54	Vertical	PK
5	4961.218	39.91	7.59	47.50	54.00	6.50	Vertical	AV
6	4961.218	47.10	7.59	54.69	74.00	19.31	Vertical	PK
7	7441.937	30.98	15.39	46.37	54.00	7.63	Vertical	AV
8	7441.937	38.52	15.39	53.91	74.00	20.09	Vertical	PK

6. TEST SETUP PHOTOS OF THE EUT

Radiated Emissions



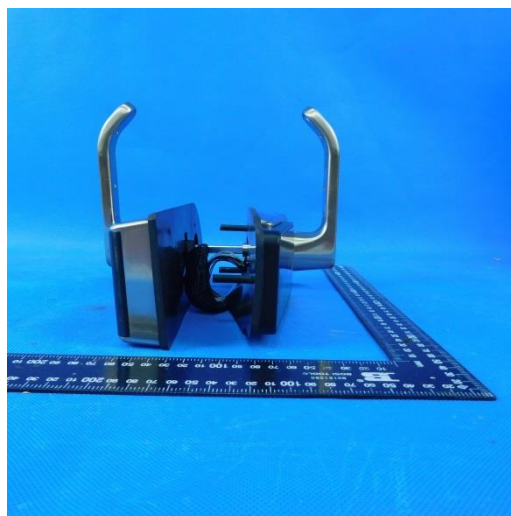
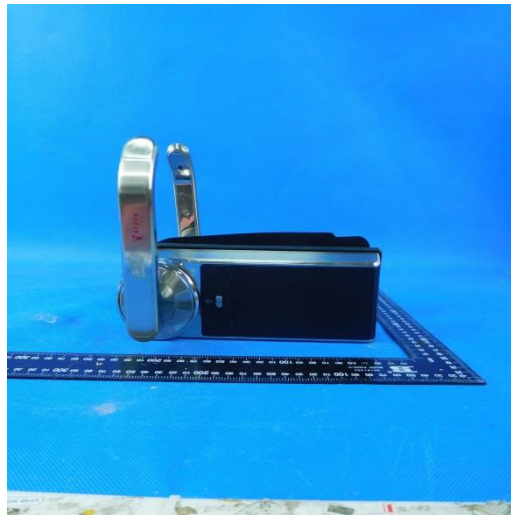
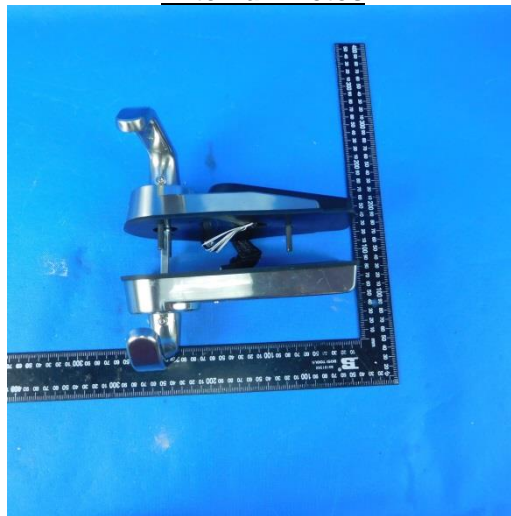


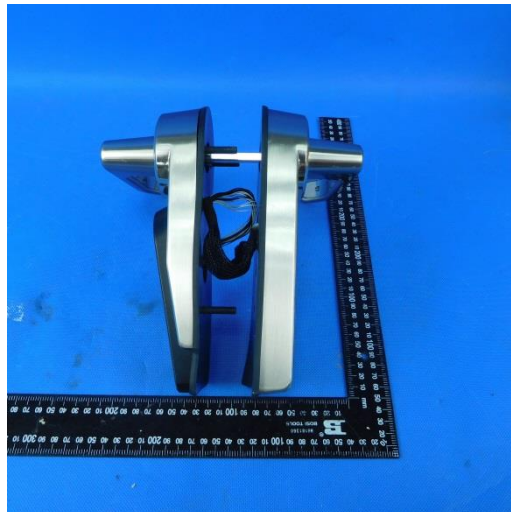
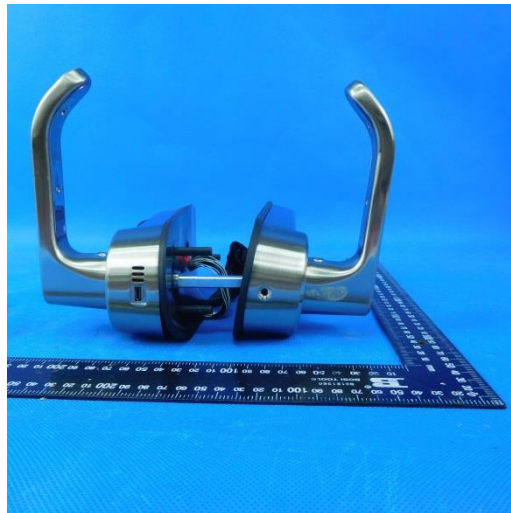
Conducted Emission



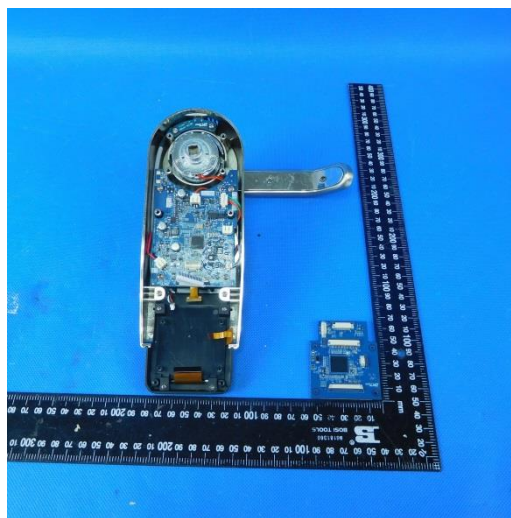
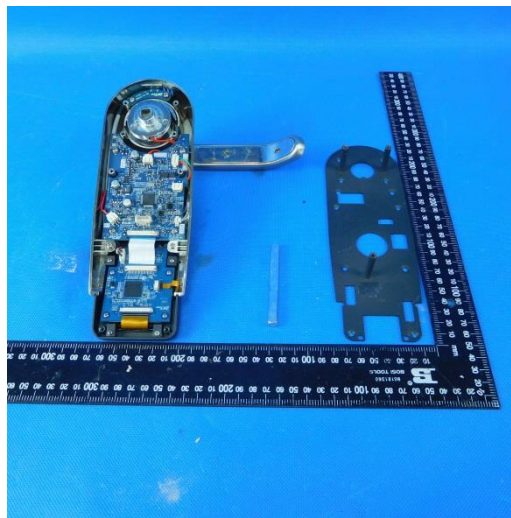
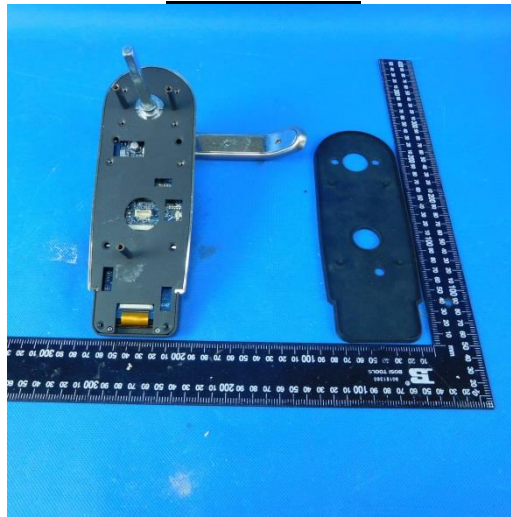
7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

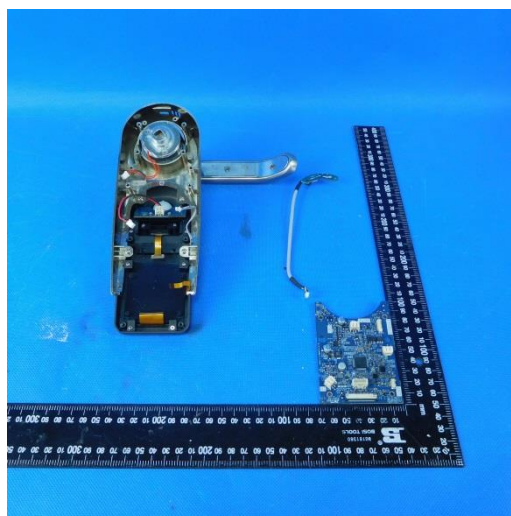
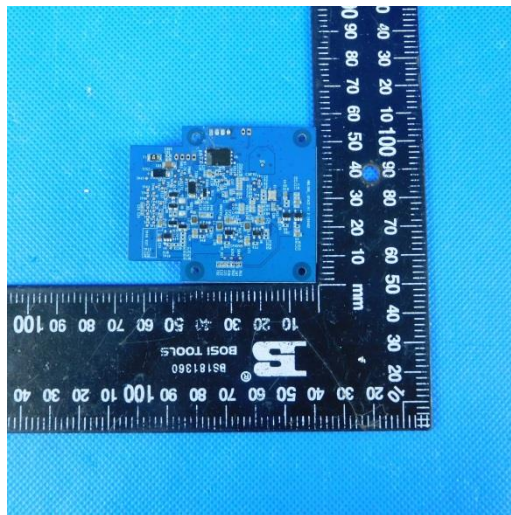
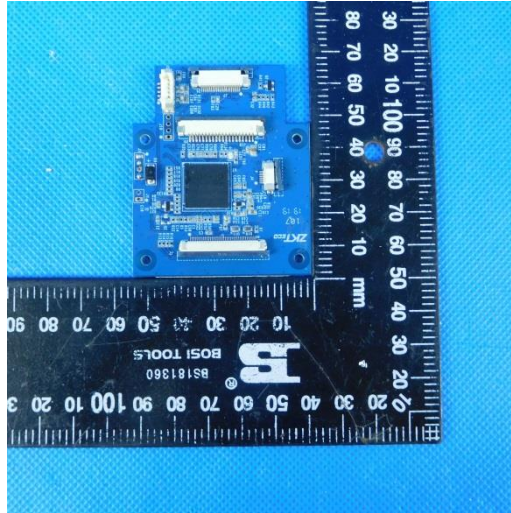
External Photos

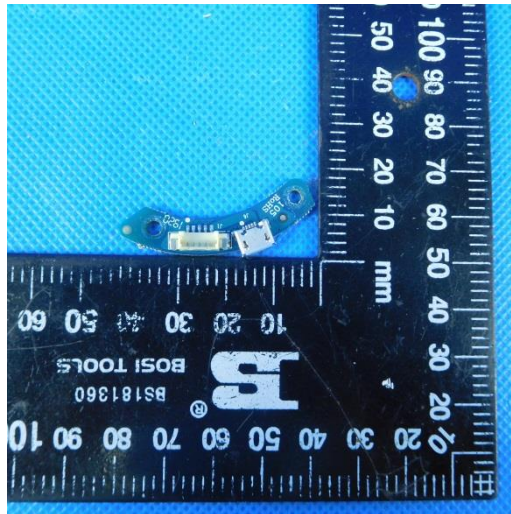
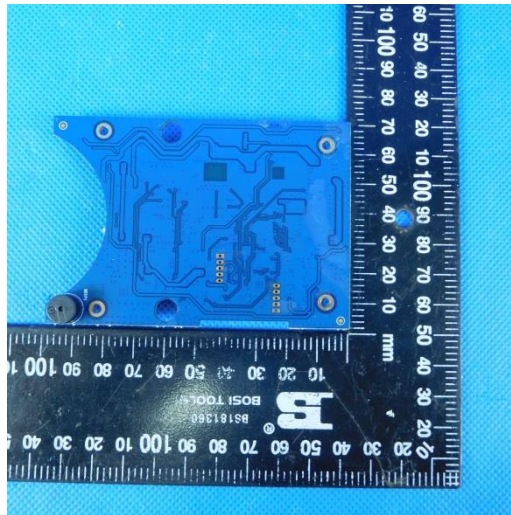
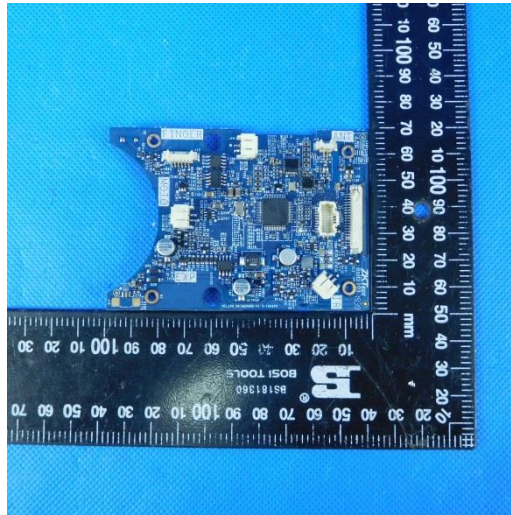


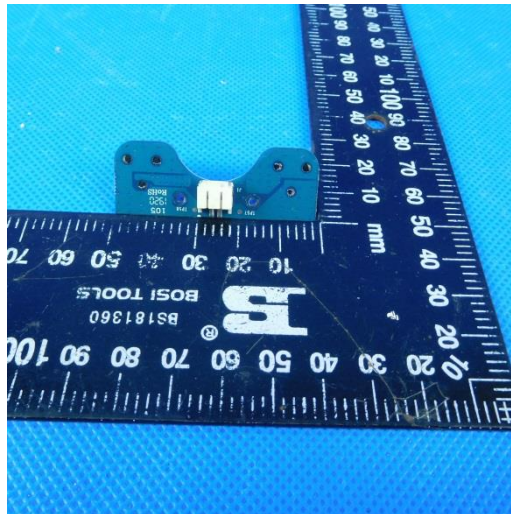
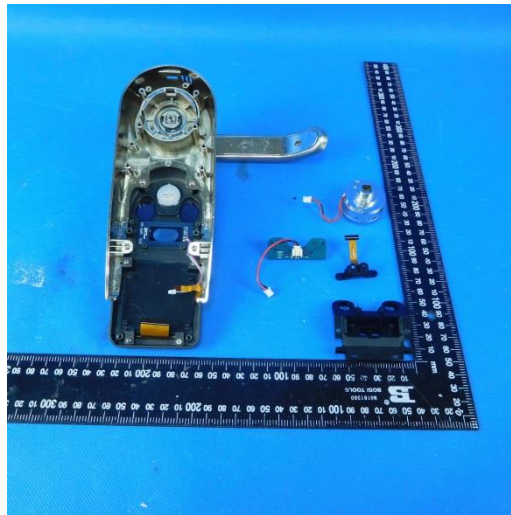
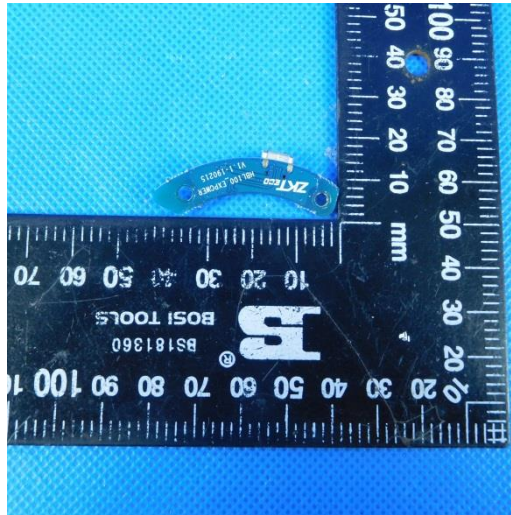


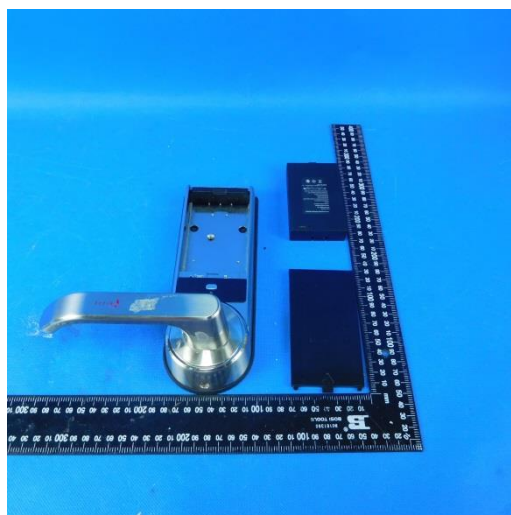
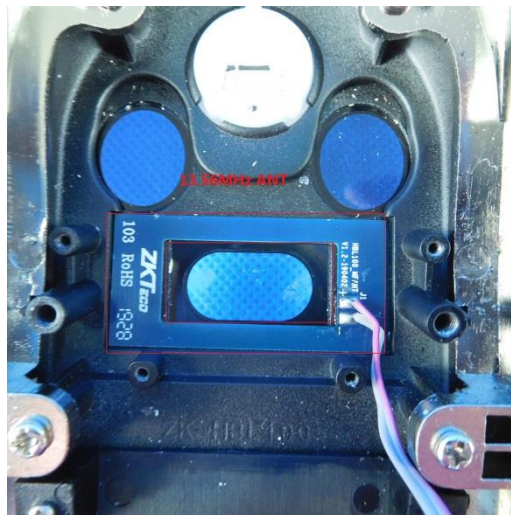
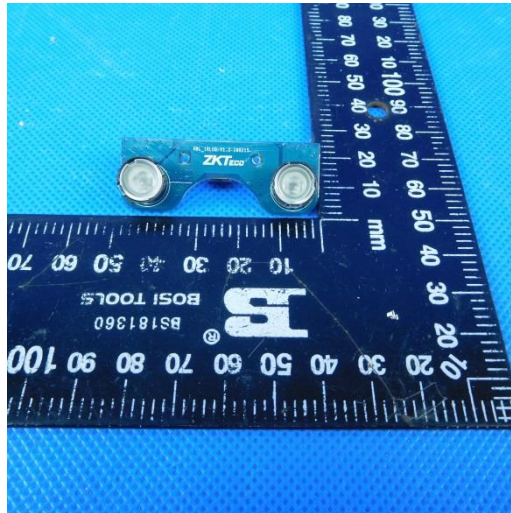
Internal Photos

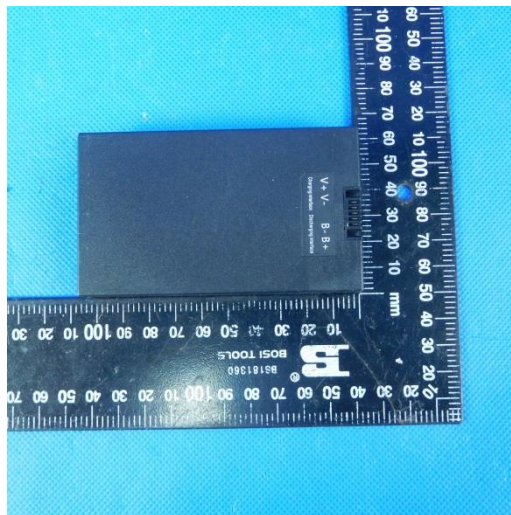
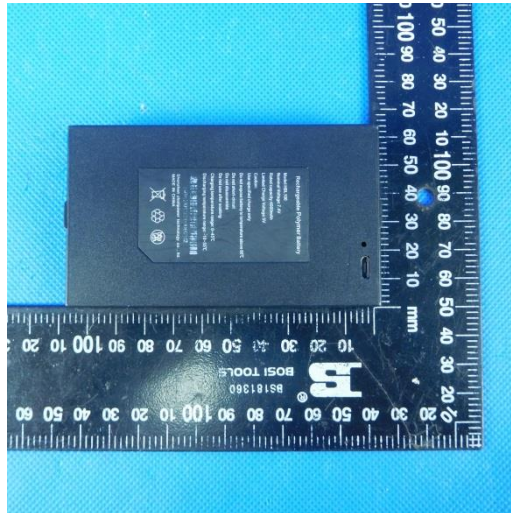


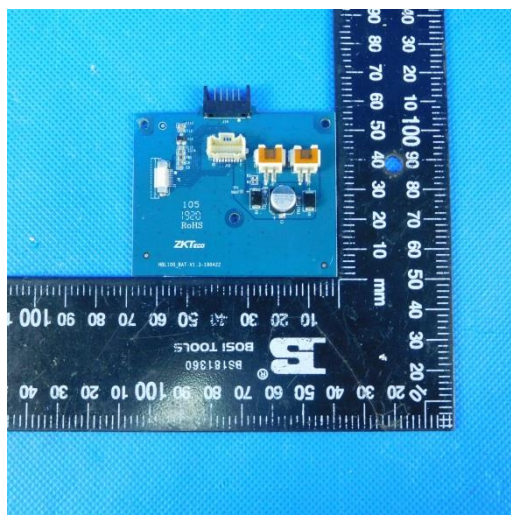
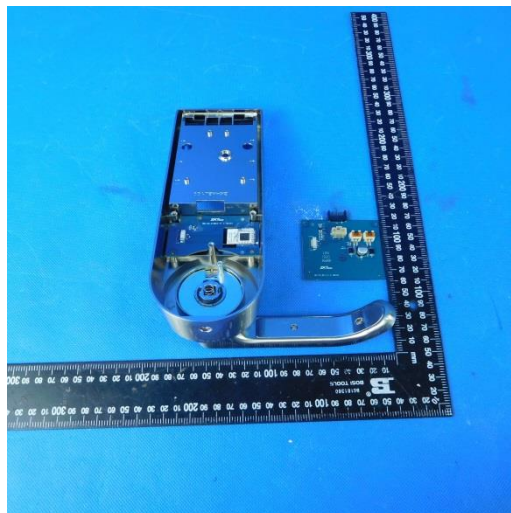
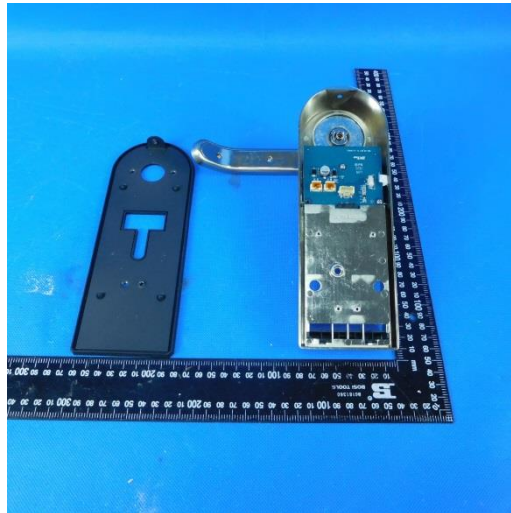


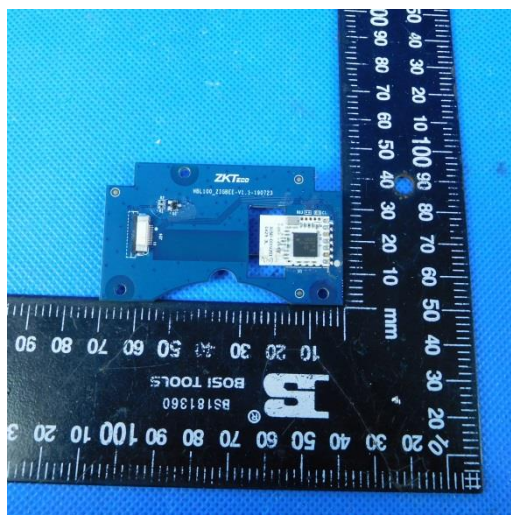
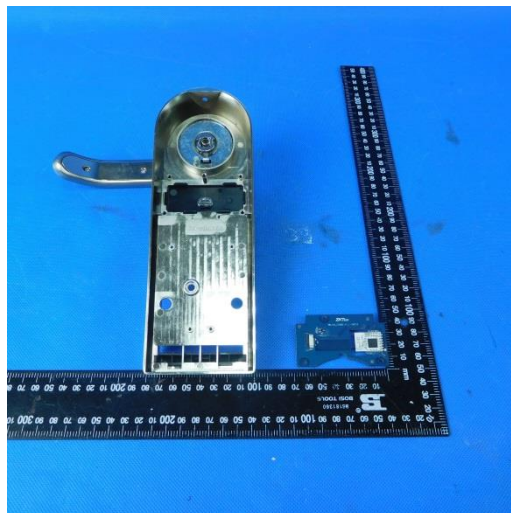
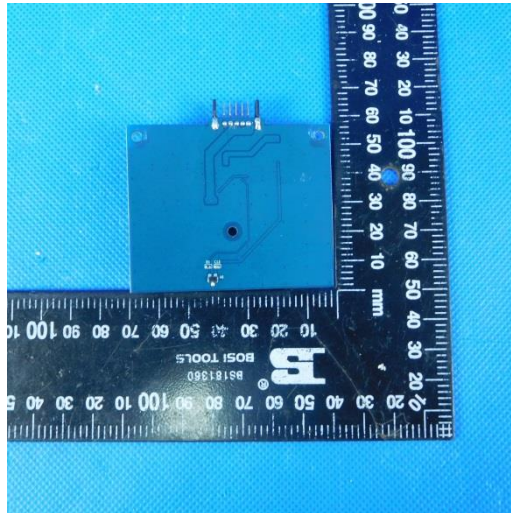


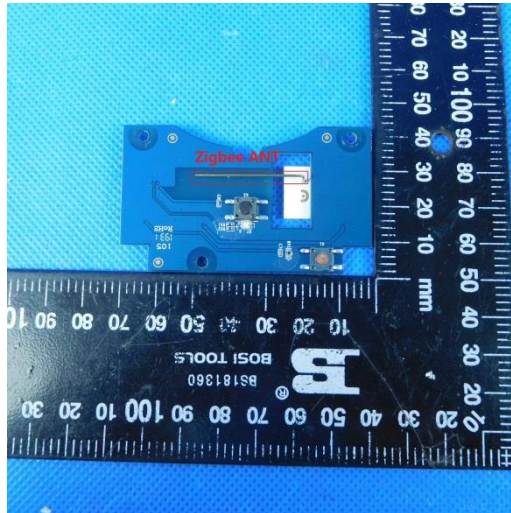












-----End of Report-----