Shenzhen CTL Testing Technology Co., Ltd.
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TEST REPORT

FCC PART 15.225

Report Reference No. ..... :	**CTL2307109033-WF**	
Compiled by: (position+printed name+signature)	Happy Guo (File administrators)	Happy Guo
Tested by: (position+printed name+signature)	Jack Wang (Test Engineer)	Wang
Approved by: (position+printed name+signature)	Ivan Xie (Manager)	Ivan Xie

Product Name ..... :	Radio Frequency Identification
Model/Type reference ..... :	RF-HQ50
List Model(s)..... :	RF-HQ50-TP,RF-HQ50-R4,RF-HZ50-TP,RF-HZ50-R4,RF-HZ50L-TP, RF-HZ50L-R4
Trade Mark..... :	N/A
FCC ID..... :	**2BCVU-RFHQ50**
Applicant's name ..... :	**Superisys (Wuhan) Intelligent Technology Co., Ltd**
Address of applicant ..... :	12-1B U Valley, Liandong, Yangluo Development Zone, Wuhan City
Test Firm..... :	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm ..... :	Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No. 3011 Shahe West Road, Nanshan District, Shenzhen
Test specification..... :	
Standard ..... :	**FCC Part 15.225:** Operation within the band 13.110–14.010 MHz.
TRF Originator ..... :	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF..... :	Dated 2011-01
Date of receipt of test item ..... :	Aug. 10, 2023
Date of Test Date..... :	Aug. 10, 2023- Sep. 04, 2023
Data of Issue ..... :	Sep. 05, 2023

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TEST REPORT

Test Report No. :	CTL2307109033-WF	Sep. 05, 2023 Date of issue

Equipment under Test	:	Radio Frequency Identification
Sample No	:	CTL2307109033
Model /Type	:	RF-HQ50
Listed Models	:	RF-HQ50-TP,RF-HQ50-R4,RF-HZ50-TP, RF-HZ50-R4,RF-HZ50L-TP,RF-HZ50L-R4
Applicant	:	**Superisys (Wuhan) Intelligent Technology Co., Ltd**
Address	:	12-1B U Valley, Liandong, Yangluo Development Zone, Wuhan City
Manufacturer	:	**Superisys (Wuhan) Intelligent Technology Co., Ltd**
Address	:	12-1B U Valley, Liandong, Yangluo Development Zone, Wuhan City

Test result	Pass *

* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

** Modified History **

Revisions	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2023-09-05	CTL2307109033-WF	Tracy Qi

Table of Contents Page

1. SUMMARY 5

1.1. TEST STANDARDS 5
1.2. TEST DESCRIPTION 5
1.3. TEST FACILITY 6
1.4. STATEMENT OF THE MEASUREMENT UNCERTAINTY 6

2. GENERAL INFORMATION 8

2.1. ENVIRONMENTAL CONDITIONS 8
2.2. GENERAL DESCRIPTION OF EUT 8
2.3. EQUIPMENTS USED DURING THE TEST 9
2.4. RELATED SUBMITTAL(S) / GRANT (S) 9
2.5. MODIFICATIONS 9

3. TEST CONDITIONS AND RESULTS 10

3.1. CONDUCTED EMISSIONS TEST 10
3.2. RADIATED EMISSIONS AND BAND EDGE 13
3.3. 20DB BANDWIDTH 19
3.4. FREQUENCY STABILITY TEST DATA 20
3.5. ANTENNA REQUIREMENT 22

4. TEST SETUP PHOTOS OF THE EUT 23

5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT 24

1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.225: Operation within the band 13.110–14.010 MHz

ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

FCC PART 15 .225		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.215	20dB Bandwidth	PASS
FCC Part 15.225(a) (b) (c)	In-band Emissions	PASS
FCC Part 15.225(d)/15.207	Out-of-band Emissions	PASS
FCC Part 15.225(e)	Frequency Stability Tolerance	PASS
FCC Part 15.203/15.247 (c)	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Zone A, 1st Floor, Warehouse 2, Baisha Logistics Company, No. 3011 Shahe West Road, Nanshan District, Shenzhen

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. 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. Registration 399832, December 08, 2017.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 0.01~30MHz	±4.03dB	(1)

Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95%
(2) confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Radio Frequency Identification
Model/Type reference:	RF-HQ50
Power supply:	DC 24V from adapter
Adapter information:	MODEL:GST18A24-P1J INPUT:100-240VAC,50/60Hz 0.5A OUTPUT:24V⎓0.75A
NFC	
Operation frequency:	13.56MHz
Modulation :	ASK
No. of Channel :	1
Antenna type:	Loop Antenna

Note1: For more details, please refer to the user's manual of the EUT.
Note2: Antenna gain provided by the applicant.

2.3. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2023/05/04	2024/05/03
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
Horn Antenna	Ocean Microwave	OBH100400	26999002	2021/12/22	2024/12/21
EMI Test Receiver	R&S	ESCI	1166.5950.03	2023/05/04	2024/05/03
Spectrum Analyzer	Agilent	E4407B	MY41440676	2023/05/05	2024/05/04
Spectrum Analyzer	Agilent	N9020A	US46220290	2023/05/05	2024/05/04
Spectrum Analyzer	Keysight	N9020A	MY53420874	2023/05/05	2024/05/04
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/12/23	2024/12/22
Active Loop Antenna	Da Ze	ZN30900A	/	2021/05/13	2024/05/12
Amplifier	Agilent	8449B	3008A02306	2023/05/04	2024/05/03
Amplifier	Agilent	8447D	2944A10176	2023/05/04	2024/05/03
Amplifier	Brief&Smart	LNA-4018	2104197	2023/05/05	2024/05/04
Temperature/Humidity Meter	Ji Yu	MC501	/	2023/05/09	2024/05/08
Power Sensor	Agilent	U2021XA	MY55130004	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY55130006	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY54510008	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY55060003	2023/05/05	2024/05/04
Spectrum Analyzer	RS	FSP	1164.4391.38	2023/05/05	2024/05/04

Test Software

Name of Software	Version
TST-PASS	V2.0
EZ_EMC(Below 1GHz)	V1.1.4.2
EZ_EMC((Above 1GHz)	V1.1.4.2

2.4. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2BCVU-RFHQ50 filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

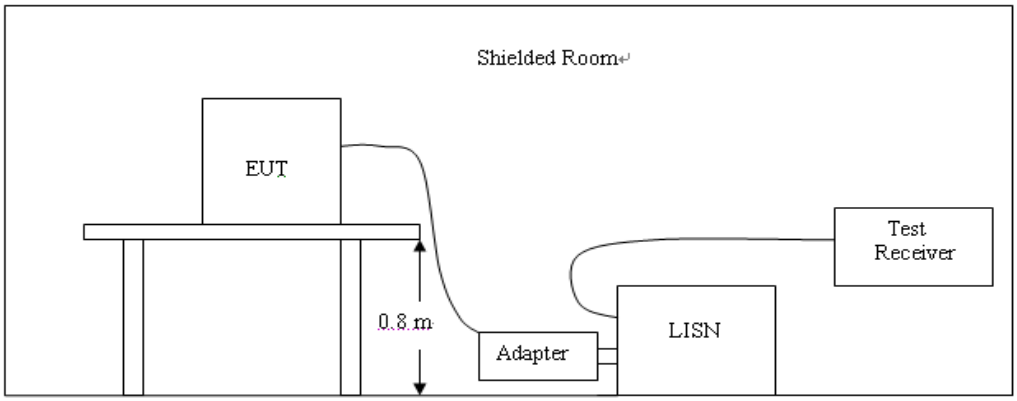
LIMIT

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

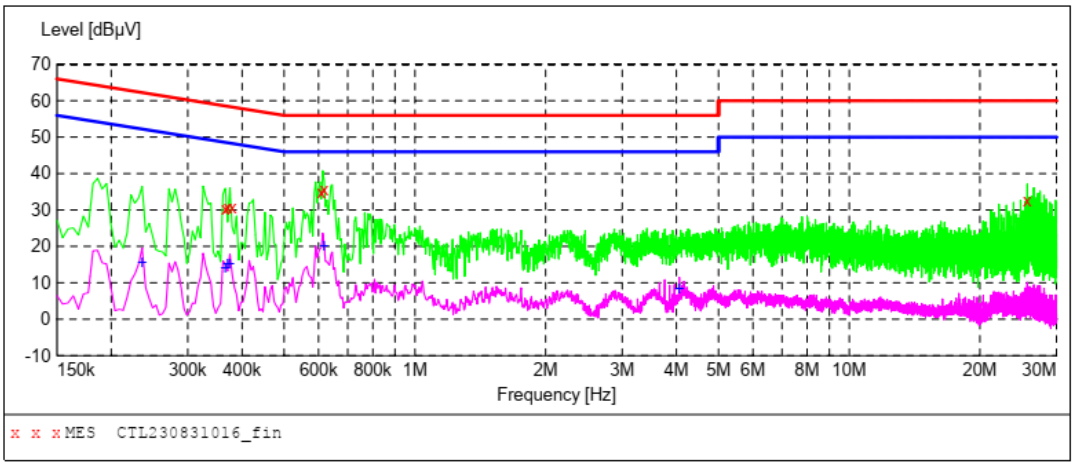
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

LINE	L

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL230831016_fin"

8/31/2023 9:55AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.366000	30.30	10.0	59	28.3	QP	L1	GND
0.370500	30.60	10.0	59	27.9	QP	L1	GND
0.379500	30.70	10.0	58	27.6	QP	L1	GND
0.609000	35.00	10.1	56	21.0	QP	L1	GND
0.618000	35.60	10.1	56	20.4	QP	L1	GND
25.701000	32.50	11.5	60	27.5	QP	L1	GND

MEASUREMENT RESULT: "CTL230831016_fin2"

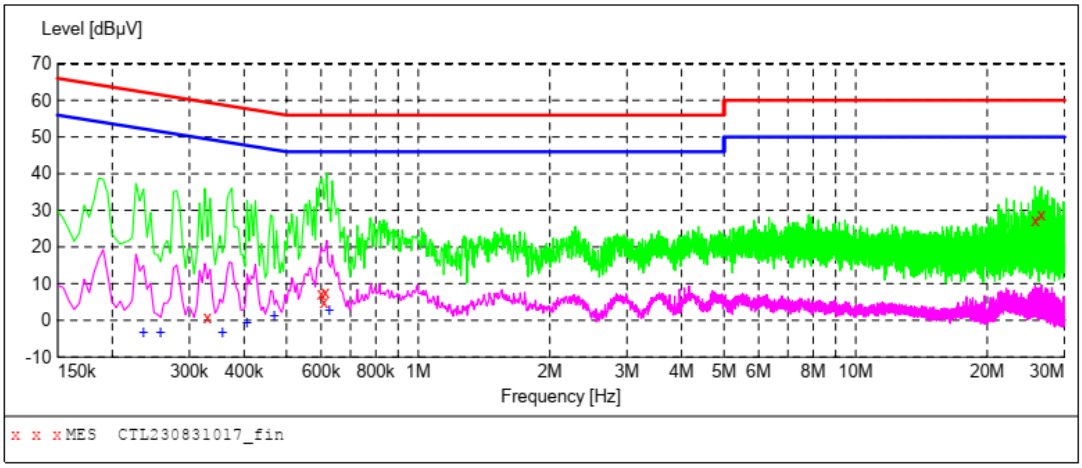
8/31/2023 9:55AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.235500	15.70	10.0	52	36.6	AV	L1	GND
0.366000	14.00	10.0	49	34.6	AV	L1	GND
0.370500	15.10	10.0	49	33.4	AV	L1	GND
0.375000	15.30	10.0	48	33.1	AV	L1	GND
0.618000	20.00	10.1	46	26.0	AV	L1	GND
4.060500	8.50	10.3	46	37.5	AV	L1	GND

LINE	N

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL230831017_fin"

8/31/2023 9:59AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.330000	0.70	10.0	60	58.8	QP	N	GND
0.600000	7.30	10.1	56	48.7	QP	N	GND
0.609000	5.10	10.1	56	50.9	QP	N	GND
0.613500	7.60	10.1	56	48.4	QP	N	GND
25.710000	27.10	11.5	60	32.9	QP	N	GND
26.601000	28.90	11.5	60	31.1	QP	N	GND

MEASUREMENT RESULT: "CTL230831017_fin2"

8/31/2023 9:59AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.235500	-3.30	10.0	52	55.6	AV	N	GND
0.258000	-3.40	10.0	52	54.9	AV	N	GND
0.357000	-3.50	10.0	49	52.3	AV	N	GND
0.406500	-0.60	10.0	48	48.3	AV	N	GND
0.469500	1.00	10.0	47	45.5	AV	N	GND
0.627000	2.80	10.1	46	43.2	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

a The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

b Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

c Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

d The field strength of any emissions appearing outside of the 13.110– 14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

Frequency (MHz)	Distance (Meters)	Radiated (dBuV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-13.110	3	69.54	30
13.110-13.410	3	80.50	106
13410-13.553	3	90.47	334
13.553-13.567	3	124.00	15848
13.567-13.710	3	90.47	334
13.710-14.010	3	80.50	106
14.010-30.0	3	69.54	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

e Field strength of fundamental emissions limit and Mask limit:

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (microvolts/meter)	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103.08 (QP)	124 (QP)

Mask Limit:

Frequency (MHz)	Limit (dBuV/m)	Distance (m)
1.705-13.110	69.5	3
13.110-13.410	80.5	3
13.410-13.553	90.5	3
13.553-13.567	124.0	3
13.567-13.710	90.5	3
13.710-14.010	80.5	3
14.010-30.000	69.5	3

Test Procedure

1. The EUT was placed on 80cm wooden desk above ground plane which on a turn table.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna

both horizontal and vertical.

4. Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

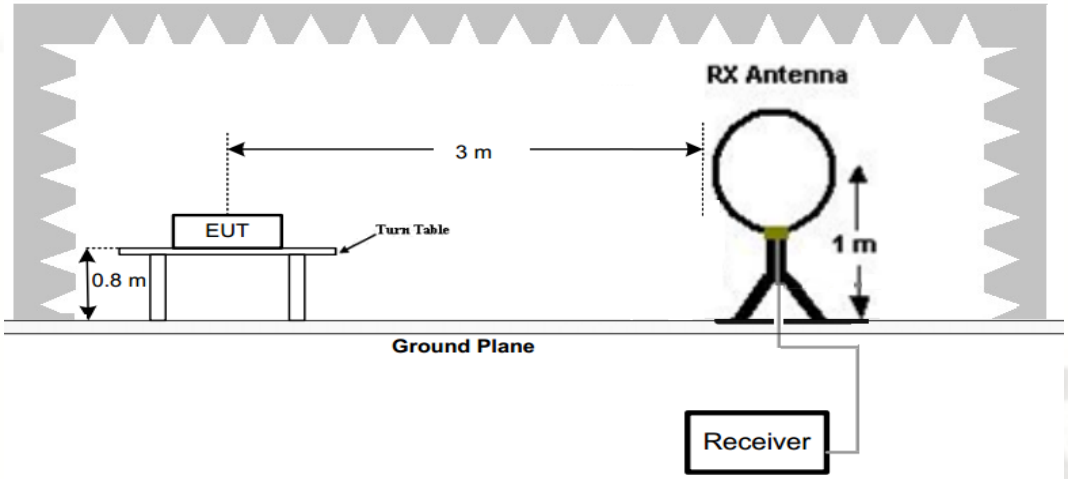
For example

Frequency (MHz)	FS (dBuV/m)	RA (dBuV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
150.00	40	58.1	12.2	1.6	31.90	-18.1

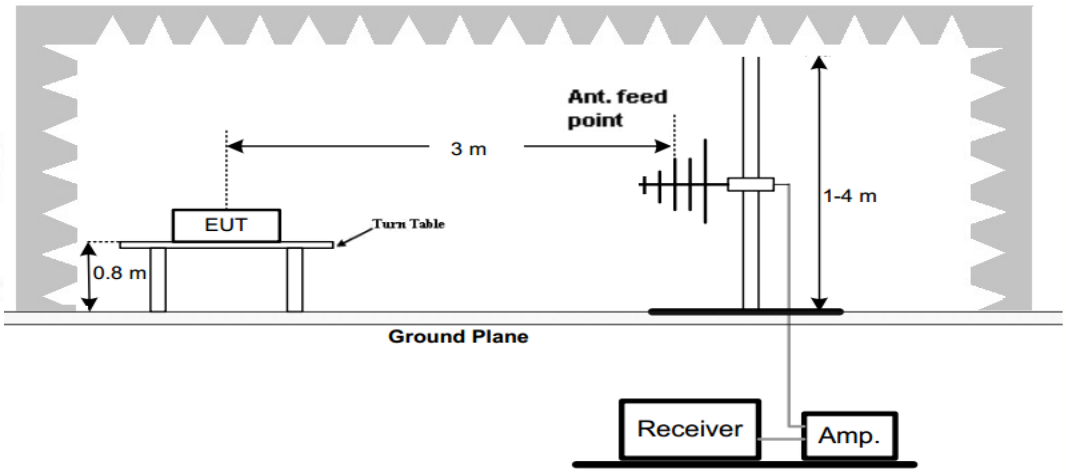
Transd=AF +CL-AG

Test Configuration

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



Test Results

3.2.1 Field Strength of Fundamental:

Remark: This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Reading (dBuV)	Factor (dB/m)	Polarization
13.56	89.13	QP	124.00	31.27	92.73	-3.60	Horizontal
	91.26	QP	124.00	29.14	94.86	-3.60	Vertical

REMARKS:

1. Emission level (dBuV/m) = Reading (dBuV)+ Factor (dB/m)
2. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.

3.2.2 In-band Emissions

Frequency(MHz):			13.56			Polarity:		HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Correction Factor (dB/m)
1	13.19	49.56	PK	80.50	47.52	75.80	5.26	-0.56	4.70
2	13.23	32.98	PK	80.50	30.93	85.68	5.36	-0.57	4.79
3	13.86	49.57	PK	80.50	21.38	119.12	5.45	-0.57	4.88
4	13.88	59.12	PK	80.50	30.65	85.33	5.49	-0.35	5.14
5	13.97	49.85	PK	80.50	47.52	75.17	5.63	-0.30	5.33

Frequency(MHz):			13.56			Polarity:		VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Correction Factor (dB/m)
1	13.19	50.56	PK	80.50	29.94	75.80	5.26	-0.56	4.70
2	13.23	30.89	PK	80.50	49.61	85.68	5.36	-0.57	4.79
3	13.86	48.75	PK	80.50	31.75	119.12	5.45	-0.57	4.88
4	13.88	60.22	PK	80.50	20.28	85.33	5.49	-0.35	5.14
5	13.97	50.80	PK	80.50	29.70	75.17	5.63	-0.30	5.33

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)
3. Margin value = Limit value- Emission level.
4. The other emission levels were very low against the limit.

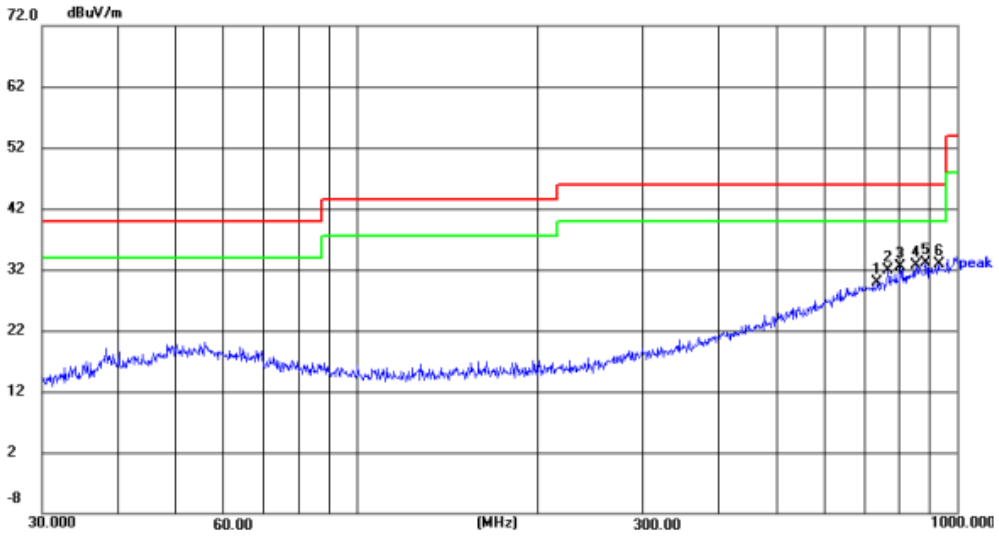
For 30MHz-1GHz

Polarization:	Horizontal

Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, She

Radiated Emission Measurement

File :RF Data :#5945 Date: 2023/08/29 Time: 17:44:43



Site LAB Chamber 2
Limit: FCC Part15C
EUT: /
M/N: RF-HQ50
Mode: 13.56MHz
Note: Shenzhen QianWen Information Technology Co., Ltd

Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

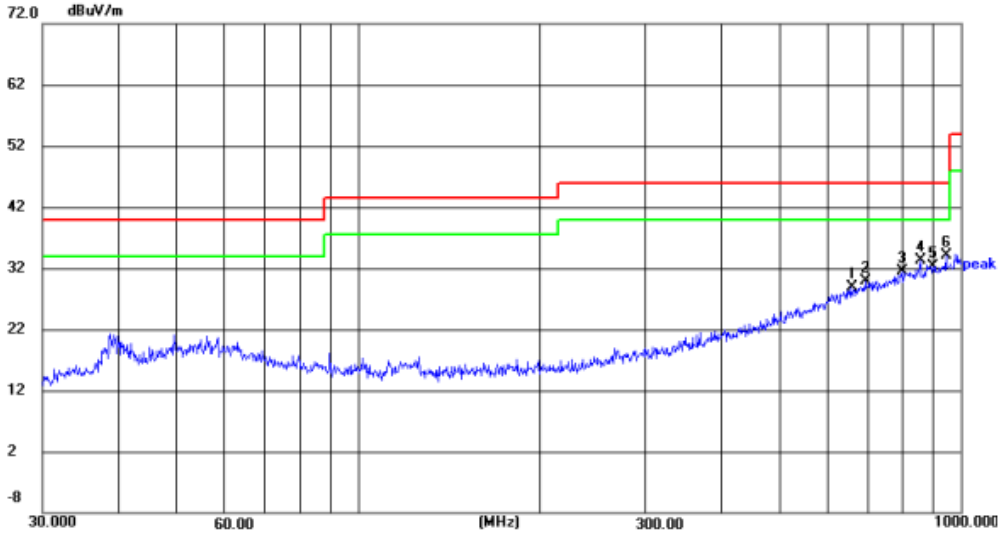
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	737.0713	7.17	22.81	29.98	46.00	16.02	peak	100	20	P	
2	768.7481	8.25	23.64	31.89	46.00	14.11	peak	100	92	P	
3	804.6027	8.04	24.51	32.55	46.00	13.45	peak	100	112	P	
4	854.0247	7.77	25.01	32.78	46.00	13.22	peak	100	27	P	
5	887.6098	7.68	25.36	33.04	46.00	12.96	peak	100	316	P	
6	932.2715	7.08	25.87	32.95	46.00	13.05	peak	100	165	P	

Polarization:	Vertical

Shenzhen CTL Testing Technology Co., Ltd
Tel: +86-755-89486194
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, She

Radiated Emission Measurement

File :RF Data :#5946 Date: 2023/08/29 Time: 17:46:00



Site LAB Chamber 2
Limit: FCC Part15C
EUT: /
M/N: RF-HQ50
Mode: 13.56MHz
Note: Shenzhen QianWen Information Technology Co., Ltd

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 25(C)
Humidity: 50 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	658.8362	7.39	21.46	28.85	46.00	17.15	peak	100	183	P	
2	694.4174	8.21	21.79	30.00	46.00	16.00	peak	100	150	P	
3	798.9797	7.05	24.43	31.48	46.00	14.52	peak	100	104	P	
4	857.0247	8.21	25.04	33.25	46.00	12.75	peak	100	281	P	
5	900.1474	6.85	25.48	32.33	46.00	13.67	peak	100	32	P	
6	945.4399	8.09	26.03	34.12	46.00	11.88	peak	100	294	P	

3.2.2 Radiated emission for 9kHz-30MHz

Frequency(MHz):			9kHz-30MHz			**Polarity:**		**HORIZONTAL**	
No.	Frequency (MHz)	Emission Level (dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Correction Factor (dB/m)
1	14.31	51.62	PK	69.54	17.92	62.04	7.25	0.25	7.5
2	17.49	55.43	PK	69.54	14.11	31.19	8.25	0.56	8.81
3	20.67	57.92	PK	69.54	11.62	30.96	8.30	0.74	9.04
4	25.65	48.31	PK	69.54	21.23	30.47	8.55	0.98	9.53
5	28.73	49.56	PK	69.54	19.98	62.04	8.63	0.25	8.88

Frequency(MHz):			9kHz-30MHz			**Polarity:**		**VERTICAL**	
No.	Frequency (MHz)	Emission Level (dBuV/m)	Detector	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Correction Factor (dB/m)
1	14.31	49.02	PK	69.54	20.52	62.04	7.25	0.25	7.5
2	17.49	55.49	PK	69.54	14.05	31.19	8.25	0.56	8.81
3	20.67	61.32	PK	69.54	8.22	30.96	8.30	0.74	9.04
4	25.65	54.91	PK	69.54	14.63	30.47	8.55	0.98	9.53
5	28.73	61.22	PK	69.54	8.32	62.04	8.63	0.25	8.88

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)
3. Margin value = Limit value- Emission level.
4. The other emission levels were very low against the limit.

3.3. 20dB Bandwidth

Limit

No limit for 20dB bandwidth.

Test Procedure

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

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Configuration

Test Results

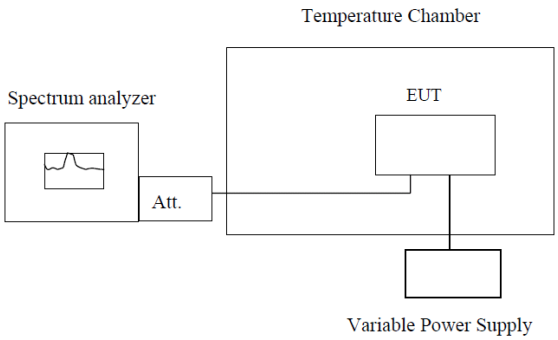
Modulation	Frequency(MHz)	20dB bandwidth (Hz)	Result
ASK	13.56015	261	Pass

3.4. Frequency Stability Test Data

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.

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
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 20℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 15%) or endpoint, record the maximum frequency change.

TEST RESULTS

Reference Frequency: 13.56MHz				
Voltage (V)	Temperature (℃)	Frequency (Hz)	Frequency Deviation(Hz)	Deviation (%)
24.0	+20(Ref)	13560041	41	0.00030
	-20	13560043	43	0.00032
	-10	13560068	68	0.00050
	0	13560031	31	0.00023
	+10	13560050	50	0.00037
	+20	13560019	19	0.00014
	+25	13560089	89	0.00066
	+30	13560078	78	0.00058
	+40	13560031	31	0.00023
	+50	13560063	63	0.00046
26.4	+20	13560078	78	0.00058
21.6	+20	13560081	81	0.00060

3.5. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

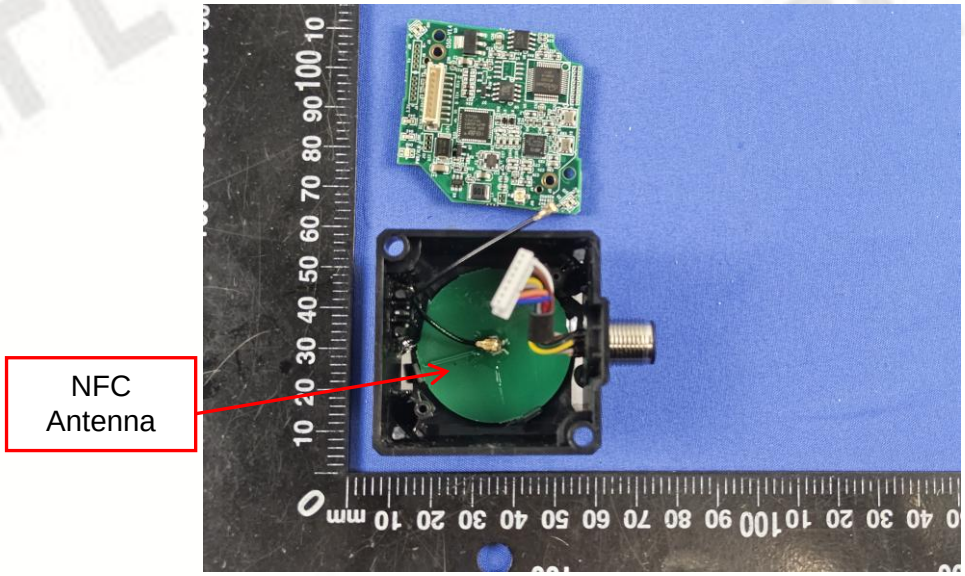
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

(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.

Test Result:

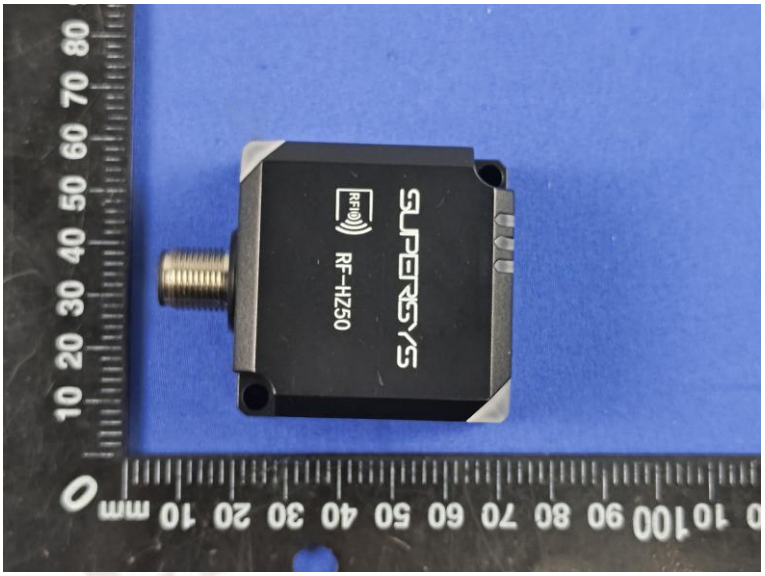
The maximum gain of antenna was 0dBi.

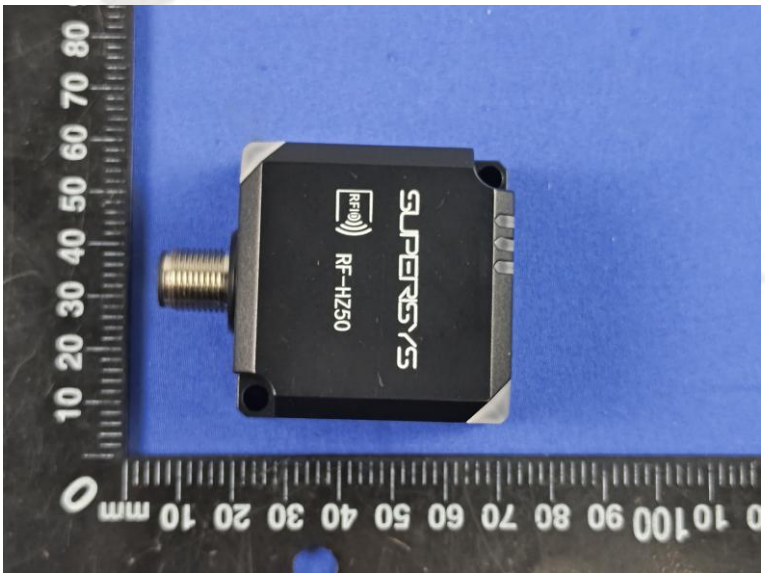


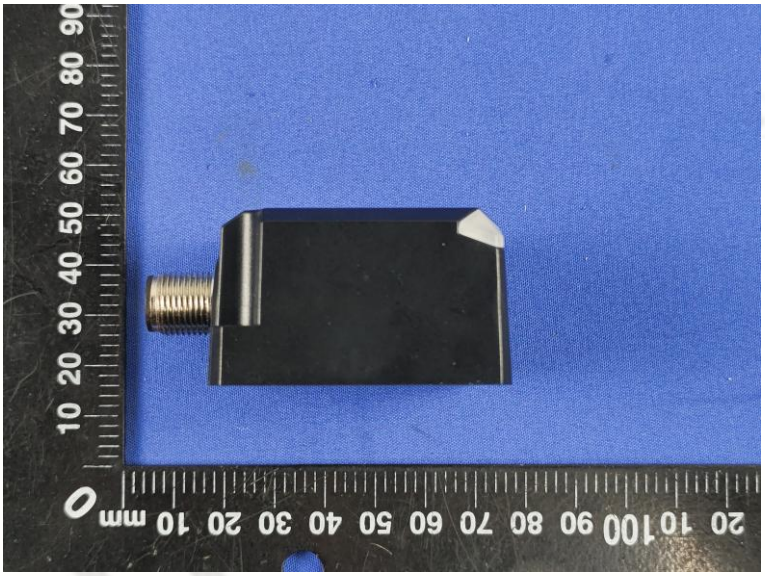
4. Test Setup Photos of the EUT

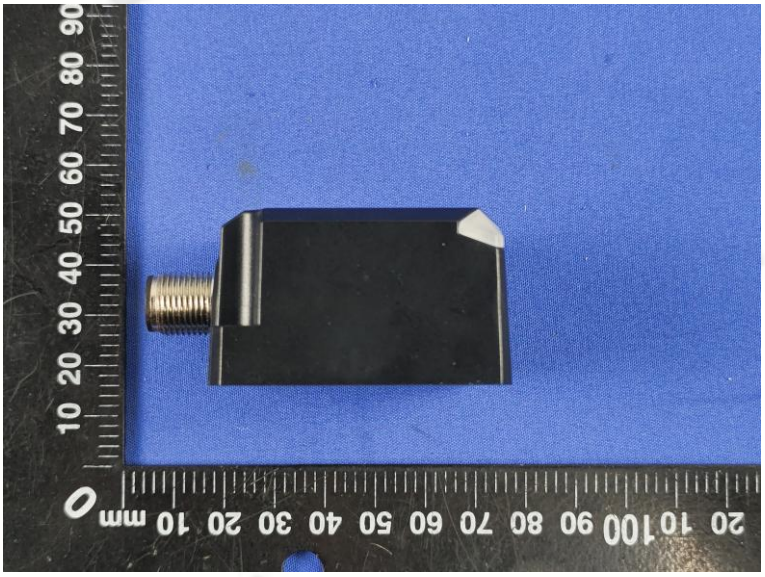
5. External and Internal Photos of the EUT

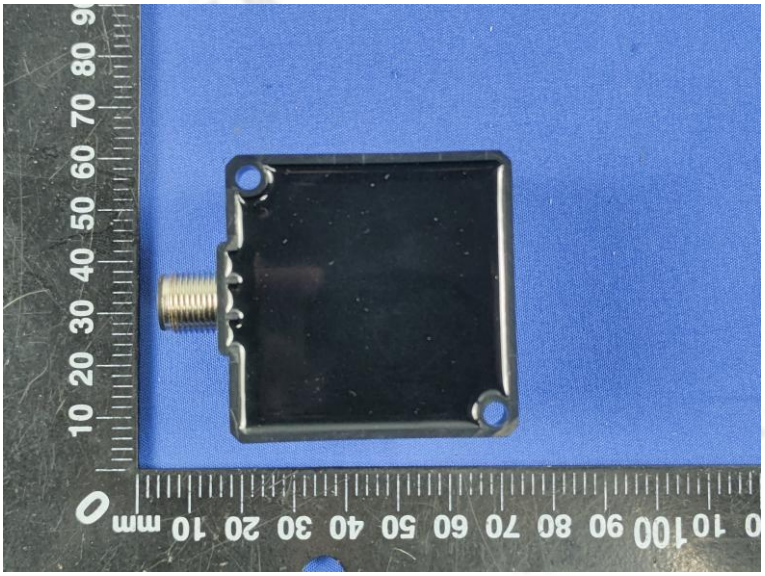
External Photos

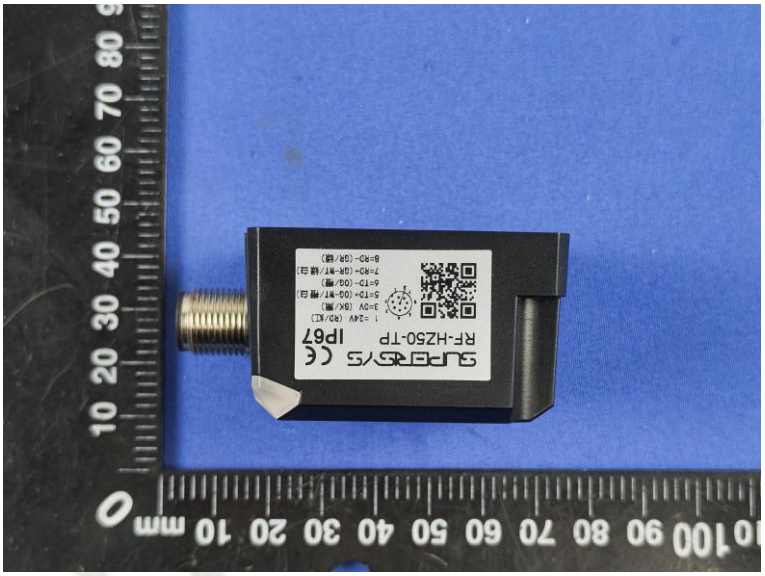


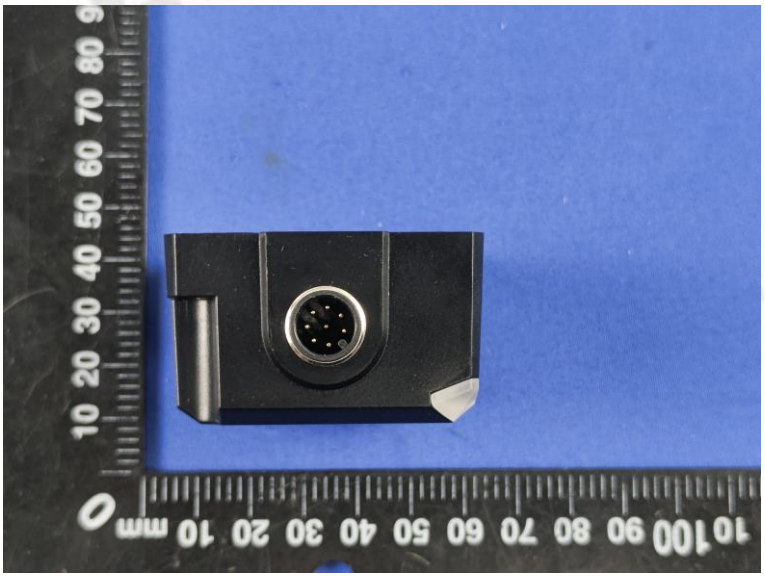


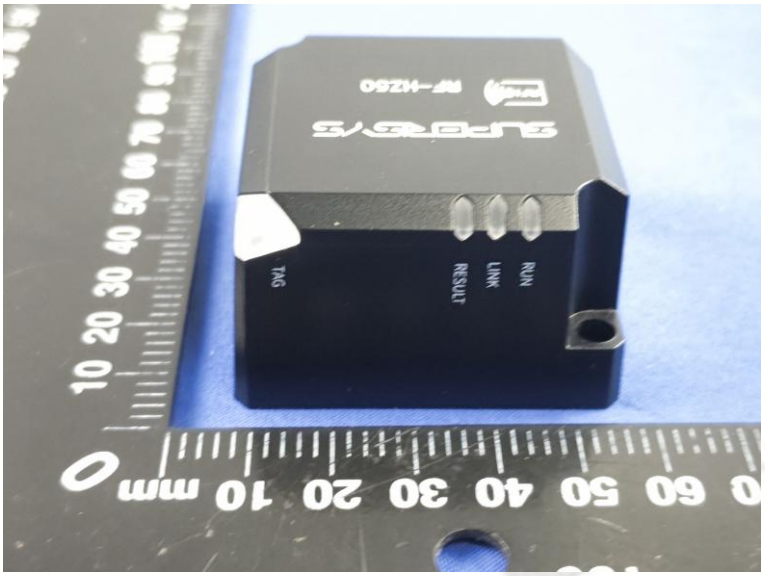




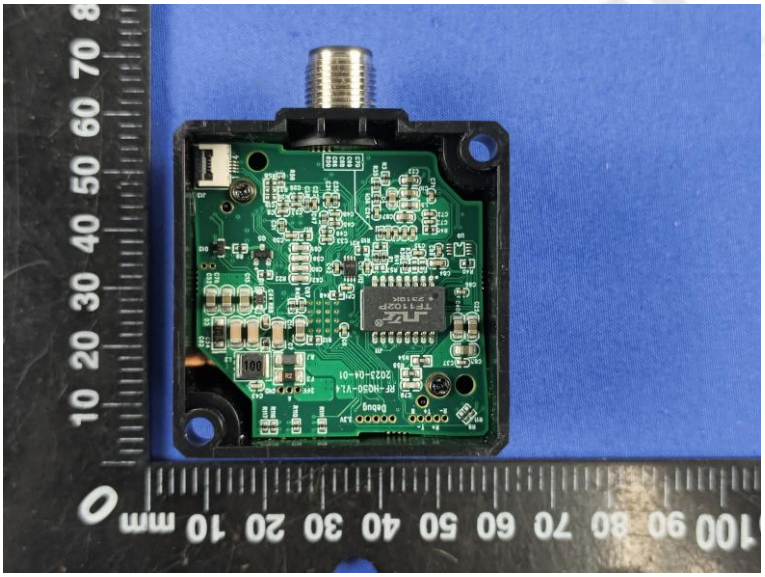


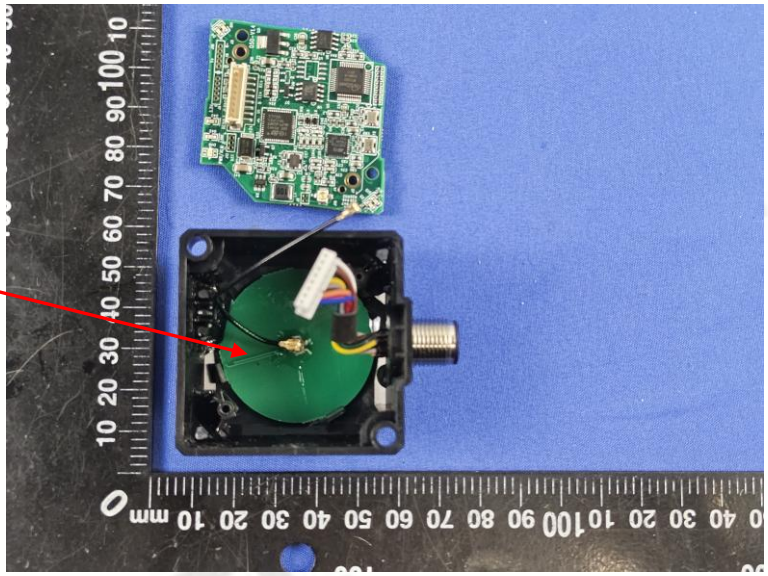

SUPORS/S
RF-HZ50-TP
IP67

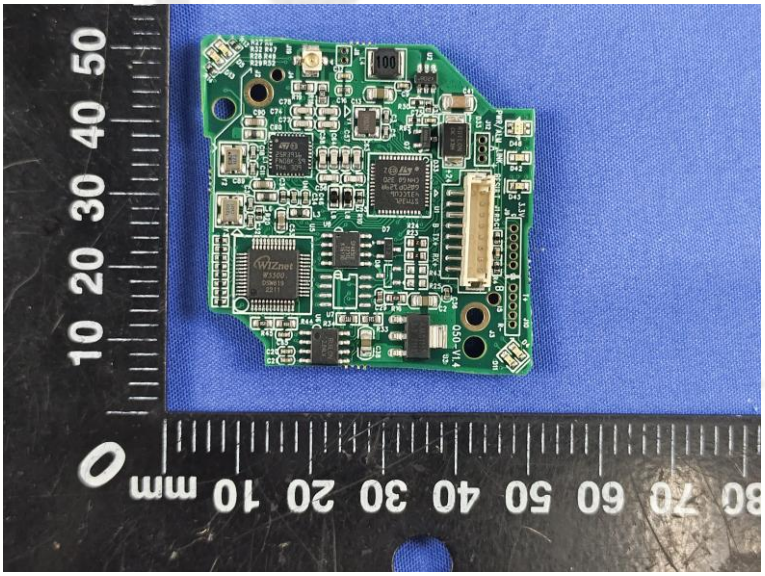


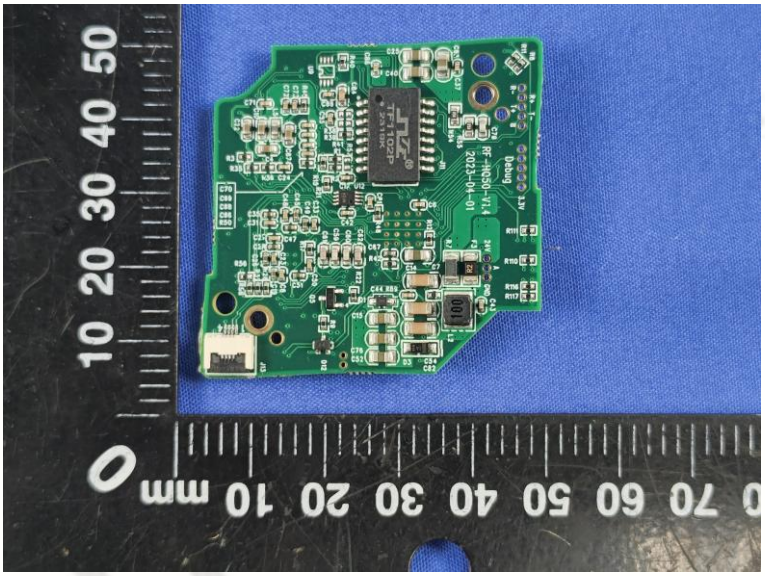

SUPORS/S
RF-HZ50
TAG
RESULT
LINK
RUN

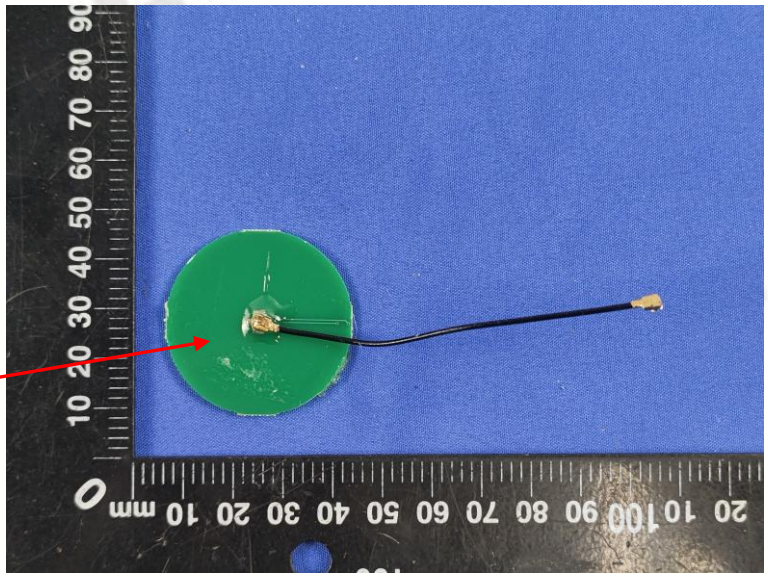
Internal Photos

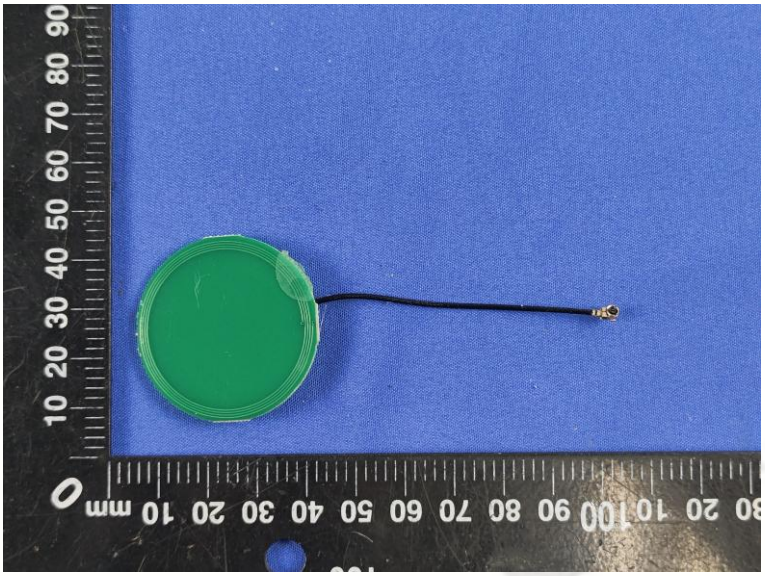


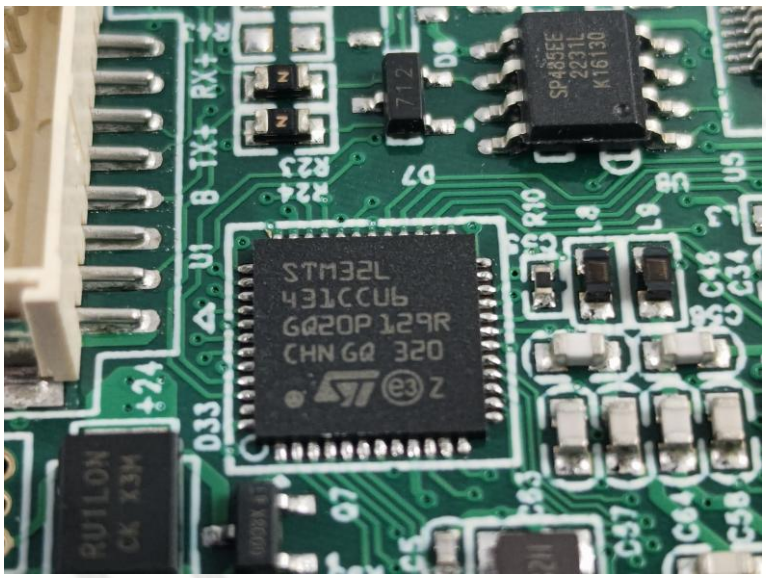


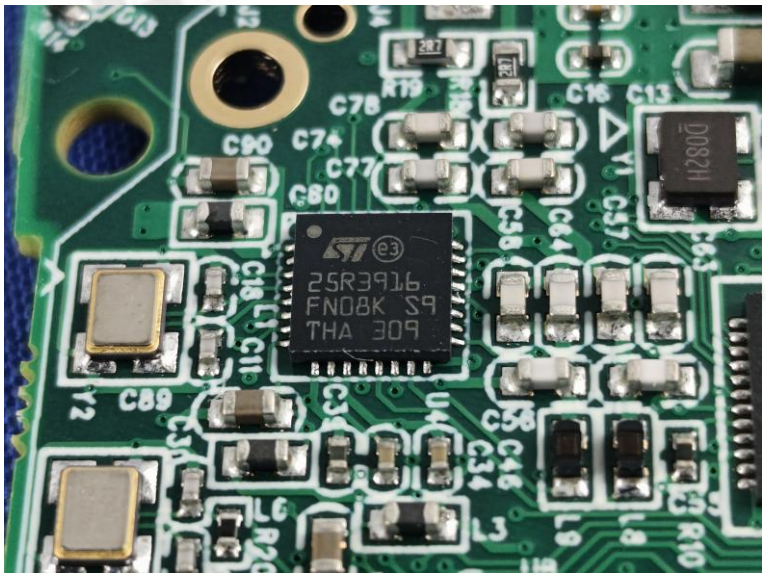





NFC
Antenna







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