



中认信通

CHINA CERTIFICATION ICT CO., LTD. (DONGGUAN)

TEST REPORT

Applicant: Shenzhen Hi-Link Electronic CO.,Ltd

Address: 1705, 1706, 1709A, Building E, Xinghe WORLD, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China

Product Name: Radar Module

Model Number: HLK-LD2410B, HLK-LD2410, HLK-LD2410-P,
HLK-LD2410-B, HLK-LD2410B-P, HLK-LD2410B-B

Standard(s): ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2 (2023-01)
ETSI EN 301 489-17 V3.2.4 (2020-09)

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR231277022-02

Date Of Issue: 2024/1/23

Reviewed By: Calvin Chen

Calvin Chen

Title: RF Engineer

Approved By: Sun Zhong

Sun Zhong

Title: Manager

Test Laboratory: China Certification ICT Co., Ltd (Dongguan)

No. 113, Pingkang Road, Dalang Town, Dongguan,
Guangdong, China
Tel: +86-769-82016888

Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The “EMS” and flicker was subcontracted to Bay Area Compliance Laboratories Corp. (Dongguan). located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

This report cannot be reproduced except in full, without prior written approval of the Company.

This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

CONTENTS

DOCUMENT REVISION HISTORY	5
1. GENERAL INFORMATION	6
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	6
1.2 DESCRIPTION OF TEST CONFIGURATION.....	7
1.2.1 EUT Operation Condition.....	7
1.2.2 Support Equipment List and Details	7
1.2.3 Support Cable List and Details	7
1.2.4 Block Diagram of Test Setup.....	8
1.3 MEASUREMENT UNCERTAINTY	8
2. SUMMARY OF TEST RESULTS	9
3. REQUIREMENTS AND TEST PROCEDURES	10
3.1 ENCLOSURE OF ANCILLARY EQUIPMENT MEASURED ON A STAND ALONE BASIS	10
3.1.1 Test System Setup.....	10
3.1.2 EMI Test Receiver Setup	11
3.1.3 Test Procedure	11
3.1.4 Corrected Amplitude & Margin Calculation.....	11
3.2 AC MAINS POWER INPUT/OUTPUT PORTS	12
3.2.1 Test System Setup.....	12
3.2.2 EMI Test Receiver Setup:	12
3.2.3 Test Procedure	12
3.2.4 Corrected Amplitude & Margin Calculation.....	13
3.3 VOLTAGE FLUCTUATIONS AND FLICKER (AC MAINS INPUT PORT).....	14
3.3.1 Test System Setup.....	14
3.3.2 Test Standard:	14
3.3.3 Flicker Test Limits:.....	14
3.4 RADIO FREQUENCY ELECTROMAGNETIC FIELDS (80 MHz To 6 000 MHz).....	15
3.4.1 Test System Setup.....	15
3.4.2 Test Level:	15
3.4.3 Test Procedure	15
3.5 ELECTROSTATIC DISCHARGES	16
3.5.1 Test System Setup.....	16
3.5.2 Test Level:	16
3.5.3 Test Procedure	17
3.6 FAST TRANSIENTS, COMMON MODE.....	18
3.6.1 Test System Setup.....	18
3.6.2 Test Level:	18
3.6.3 Test Procedure	18
3.7 RADIO FREQUENCY, COMMON MODE	19
3.7.1 Test System Setup.....	19
3.7.2 Test Level:	19
3.7.3 Test Procedure	19
3.8 VOLTAGE DIPS AND SHORT INTERRUPTIONS	20

3.8.1 Test System Setup.....	20
3.8.2 Test Level and Performance Criterion:	20
3.8.3 Test Procedure	20
3.9 SURGES	21
3.9.1 Test System Setup.....	21
3.9.2 Test Level:	21
3.9.3 Test Procedure	21
4. TEST DATA AND RESULTS	22
4.1 ENCLOSURE OF ANCILLARY EQUIPMENT MEASURED ON A STAND ALONE BASIS.....	22
4.2 AC MAINS POWER INPUT/OUTPUT PORTS	27
4.3 RADIO FREQUENCY ELECTROMAGNETIC FIELDS (80 MHz TO 6 000 MHz)	30
4.4 ELECTROSTATIC DISCHARGES	32
4.5 FAST TRANSIENTS, COMMON MODE	34
4.6 RADIO FREQUENCY, COMMON MODE	35
5. EUT PHOTOGRAPHS	36
6. TEST SETUP PHOTOGRAPHS	46
RE	46
CE_AC	49
RS	50
ESD	50
EFT	51
CS	51

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR231277022-02	Original Report	2024/1/23

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Radar Module
EUT Model:	HLK-LD2410B
Multiple Models:	HLK-LD2410, HLK-LD2410-P, HLK-LD2410-B, HLK-LD2410B-P, HLK-LD2410B-B
Highest Operation Frequency:	24250MHz
Rated Input Voltage:	5Vdc
Serial Number:	2FJR-3
EUT Received Date:	2023/12/21
EUT Received Status:	Good
Note: The Multiple models are electrically identical with the test model. Please refer to the declaration letter for more detail, which was provided by manufacturer.	

Accessory Information:

Accessory Description	Manufacturer	Model
/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition

EUT Operation Mode:	The system was configured for testing in a typical fashion (as normally used by a typical user). Test Mode: Operating
Equipment Modifications:	No
EUT Exercise Software:	The mobile application " HLKRadarTool " is used to monitor the status of Bluetooth functionality; The software " LD2410 Tool.exe " is used to monitor the status of radar functions.

1.2.2 Support Equipment List and Details

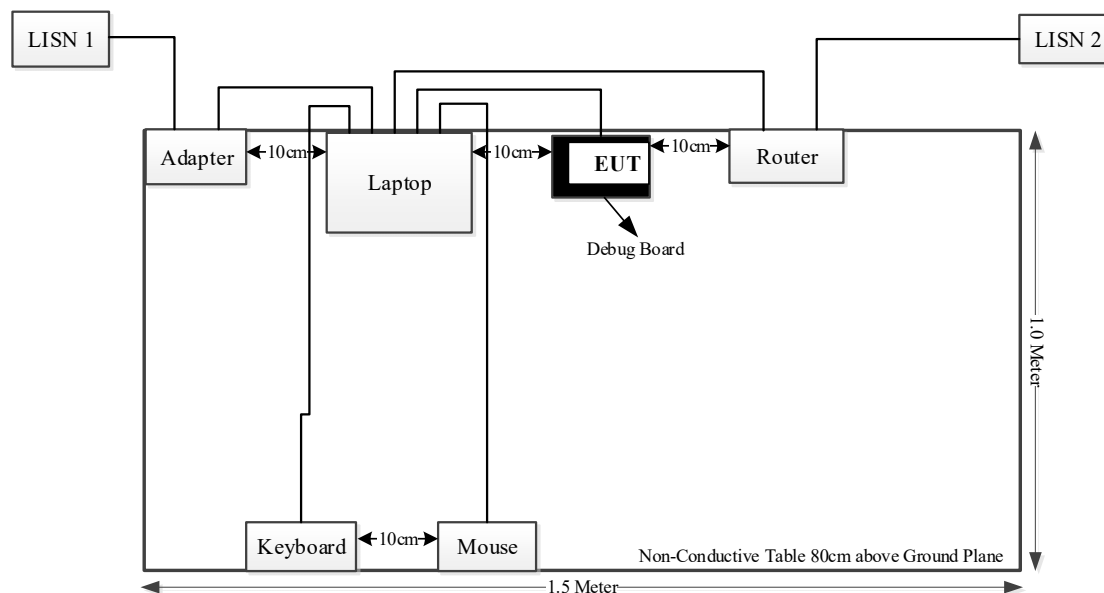
Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	T460S	60PDTEK8
Lenovo	Adapter	ADLX45DLC3A	00HM613
TOTO LINK	Router	X5000R	X5000RK9T0560
PHILIPS	Mouse	SPK7214	M214BQ210411615
PHILIPS	Keyboard	SPT6234	K234210510742
Unknown	Debug Board	Unknown	Unknown

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
AC Power Cable	No	No	1.2	LISN 1	Adapter
Adapter Output Power Cable	No	Yes	2.0	Adapter	Laptop
RJ45 Cable	No	No	1.0	Laptop	Router
Mouse Cable	No	No	1.2	Laptop	Mouse
Keyboard Cable	No	No	1.2	Laptop	Keyboard
Earphone Cable	No	No	0.8	EUT	Earphone
USB Cable	No	No	0.8	EUT	Debug Board

1.2.4 Block Diagram of Test Setup

Conducted Emissions:



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Conducted Emission,	Mains port: 2.8dB, Telecommunication port: 4.13dB
Radiated Emissions	30M~200MHz: 4.15 dB, 200M~1GHz: 5.61 dB, 1G~6GHz: 5.14 dB
Electrostatic Discharge	Rise time: 15%, Peak current: 6.3%, 30ns or 60ns current: 6.3%
Radiated, Radio-frequency, Electromagnetic Field	Calibration process: 1.88dB, Level setting: 2.19dB
Electrical Fast Transient/Burst	Rise time: 6.2%, Peak voltage: 8.6%, Pulse width: 5.9%
Surge	Front time of open-circuit voltage: 13.3%, Peak of open-circuit voltage: 8.6%, Duration of open-circuit voltage: 0.6%
Conducted Disturbances, Induced by Radio-frequency Fields	CDN calibration process: 1.27dB, CDN test process: 1.36dB
Temperature	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5\%$

2. SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 301 489 Clause 8.2	Enclosure of ancillary equipment measured on a stand alone basis	Compliant
2	EN 301 489 Clause 8.3	DC power input/output ports	Not applicable*
3	EN 301 489 Clause 8.4	AC mains power input/output ports	Compliant
4	EN 301 489 Clause 8.5	Harmonic current emissions (AC mains input port)	Not applicable*
5	EN 301 489 Clause 8.6	Voltage fluctuations and flicker (AC mains input port)	Not applicable*
6	EN 301 489 Clause 8.7	Wired network ports	Not applicable**
7	EN 301 489 Clause 9.2	Radio frequency electromagnetic fields (80 MHz to 6 000 MHz)	Compliant
8	EN 301 489 Clause 9.3	Electrostatic discharges	Compliant
9	EN 301 489 Clause 9.4	Fast transients, common mode	Compliant
10	EN 301 489 Clause 9.5	Radio frequency, common mode	Compliant
11	EN 301 489 Clause 9.6	Transients and surges in the vehicular environment	Not applicable***
12	EN 301 489 Clause 9.7	Voltage dips and short interruptions	Not applicable*
13	EN 301 489 Clause 9.8	Surges	Not applicable*

Note:

Not Applicable: Please refer to Applicability overview tables in sections 7.1 and 7.2 of EN 301 489-1 requirements for Radio and ancillary equipment.

Not Applicable*: The EUT is powered by the DC power supply of the system (the length of the power cable is less than 3m) and is not directly connected to the AC or DC mains network.

Not Applicable**: The device without any wired network ports.

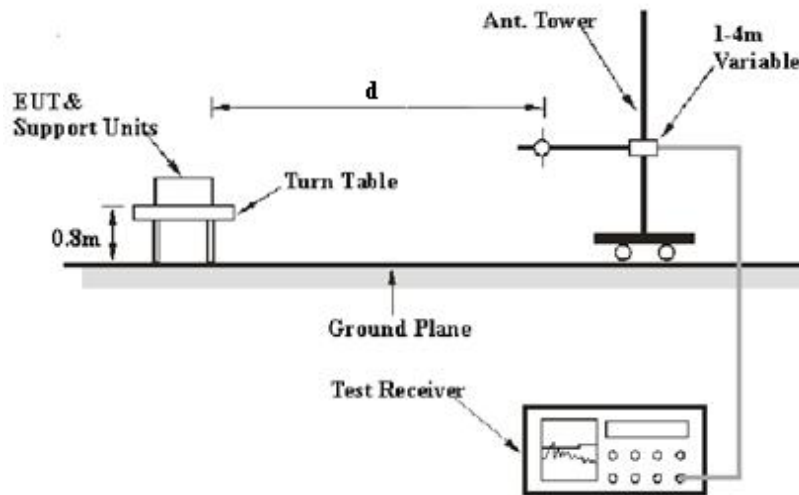
Not Applicable***: The device is not a vehicular use device.

3. REQUIREMENTS AND TEST PROCEDURES

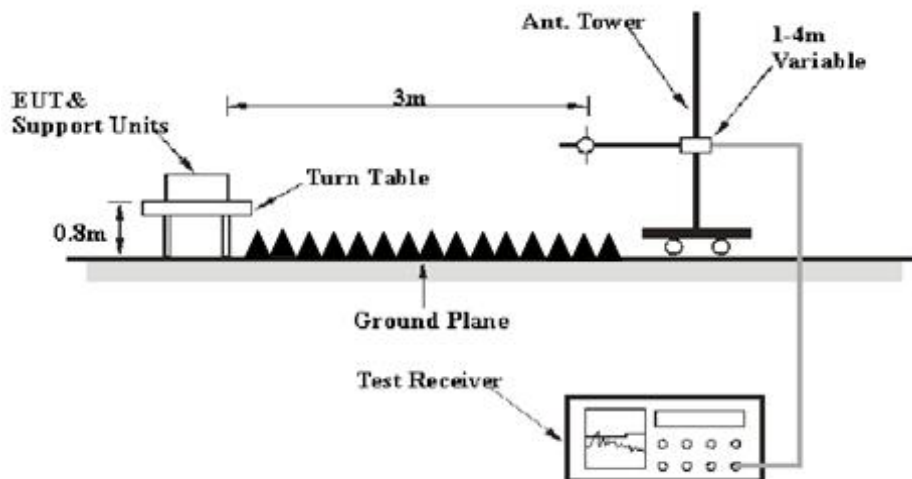
3.1 Enclosure of Ancillary Equipment Measured On A Stand Alone Basis

3.1.1 Test System Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests below 1GHz were performed in 3 meters, above 1GHz were performed in the 3 meters. The specification used was EN 55032 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

3.1.2 EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver (Below 1GHz) and Spectrum Analyzer (Above 1GHz) were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz - 1000 MHz	100 kHz	300 kHz	120kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	1MHz	10Hz	/	Average

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

3.1.3 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1GHz.

All emissions under the average limit and under the noise floor have not recorded in the report.

3.1.4 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

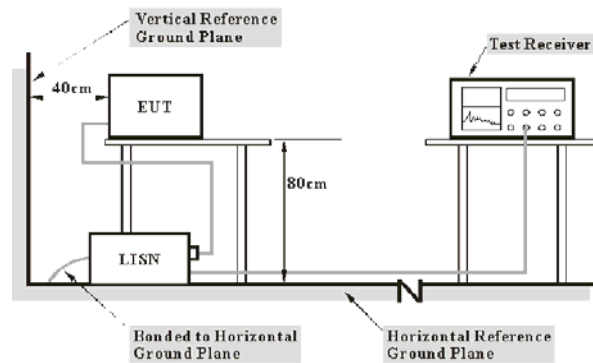
Factor = Antenna Factor + Cable Loss- Amplifier Gain

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 AC Mains Power Input/Output Ports

3.2.1 Test System Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per EN 301 489-1 measurement procedures. The specification used was with the EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

The spacing between the peripherals was 10cm.

The adapter was connected to AC230V/50Hz power source.

3.2.2 EMI Test Receiver Setup:

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz - 30 MHz	9 kHz

3.2.3 Test Procedure

During the conducted emissions test, the adapter was connected to the main outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

3.2.4 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

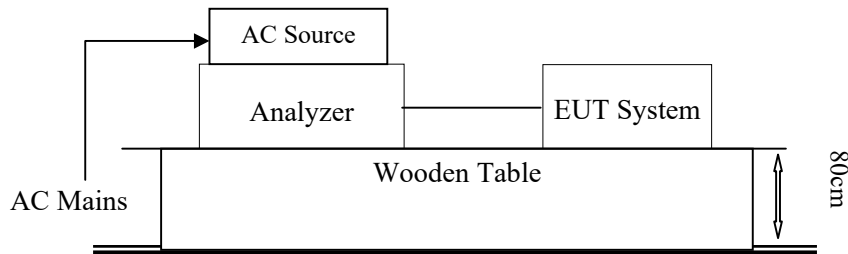
Factor = attenuation caused by cable loss + voltage division factor of AMN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.3 Voltage Fluctuations And Flicker (Ac Mains Input Port)

3.3.1 Test System Setup



3.3.2 Test Standard:

EN 61000-3-3:2013+A1:2019+A2:2021

3.3.3 Flicker Test Limits:

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.

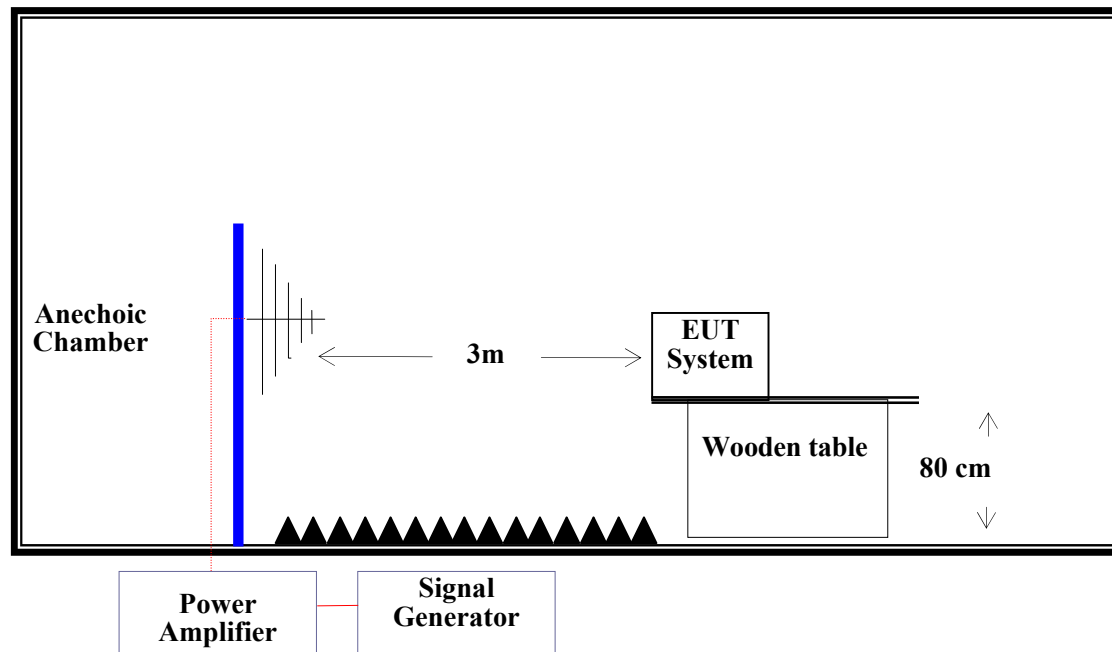
The following limits apply:

- the value of Pst shall not be greater than 1,0;
 - the value of Plt shall not be greater than 0,65;
 - the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
 - the relative steady-state voltage change, dc, shall not exceed 3,3 %;
 - the maximum relative voltage change dmax, shall not exceed
 - a) 4 % without additional conditions;
 - b) 6 % for equipment which is:
 - switched manually, or
 - switched automatically more frequently than twice per day, and also has either delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.
- Note: The cycling frequency will be further limited by the Pst and Plt limit. For example: a dmax of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.
- c) 7 % for equipment which is
 - attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
 - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

3.4 Radio Frequency Electromagnetic Fields (80 MHz To 6 000 MHz)

3.4.1 Test System Setup



3.4.2 Test Level:

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

Performance Criterion: A

General Performance Criteria:

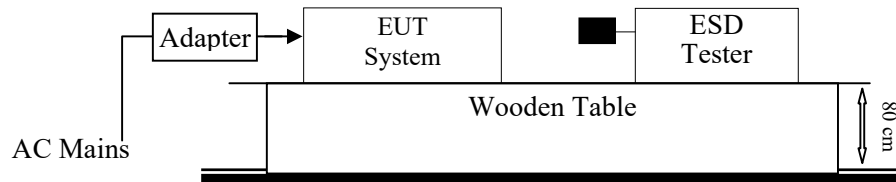
- The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacture as a permissible loss of performance.
- The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.
- The apparatus is broken, cannot be normal operated.

3.4.3 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced this antenna and measured individually.

3.5 Electrostatic Discharges

3.5.1 Test System Setup



Remark: ■ is the tip of the electrode

EN61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

3.5.2 Test Level:

Level	Test Voltage Contact Discharge (±kV)	Test Voltage Air Discharge (±kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

Test Level 3 for Air Discharge at ±8 kV

Test Level 2 for Direct Discharge at ±4 kV

Performance criterion: B

3.5.3 Test Procedure

Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section 8.3.1 of EN 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane

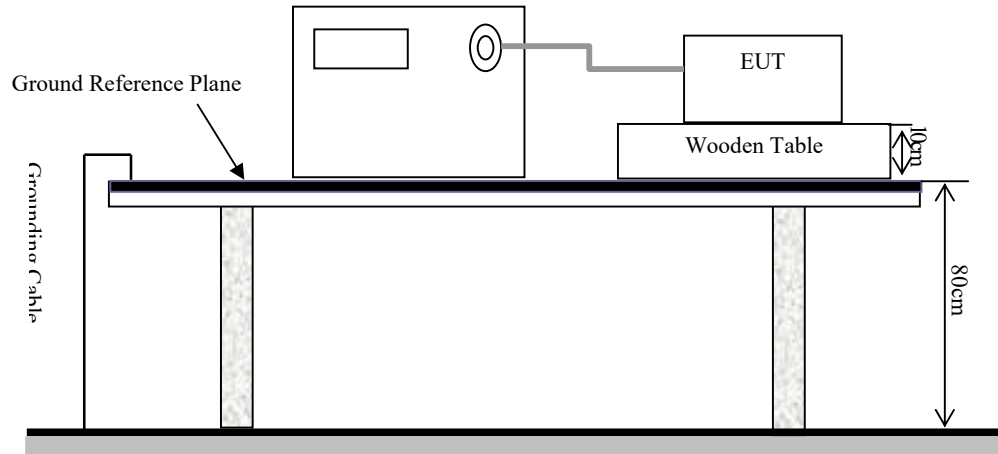
At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

3.6 Fast Transients, Common Mode

3.6.1 Test System Setup



3.6.2 Test Level:

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

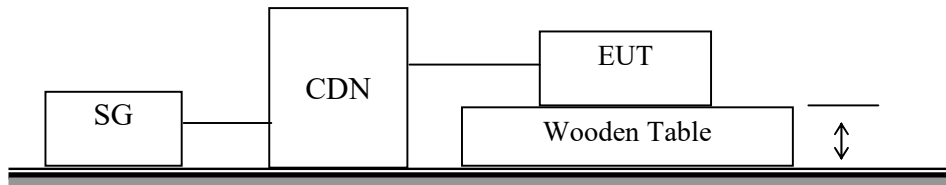
Performance Criterion: B

3.6.3 Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

3.7 Radio Frequency, Common Mode

3.7.1 Test System Setup



3.7.2 Test Level:

Level	Voltage Level (r.m.s.) (U_0)
1	1
2	3
3	10
X	Special

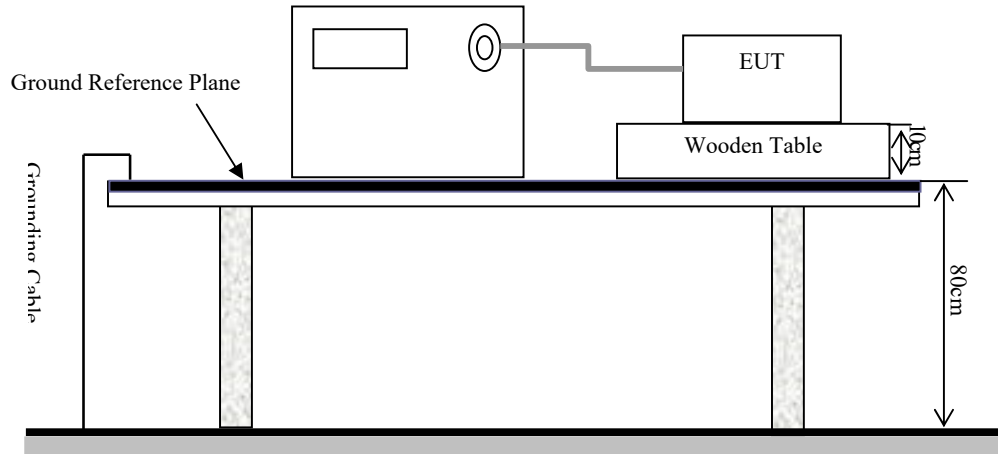
Performance Criterion: A

3.7.3 Test Procedure

- 1) Let the EUT work in test mode and test it.
- 2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 3) The disturbance signal described below is injected to EUT through CDN.
- 4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- 6) Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s.
- 7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

3.8 Voltage Dips and Short Interruptions

3.8.1 Test System Setup



3.8.2 Test Level and Performance Criterion:

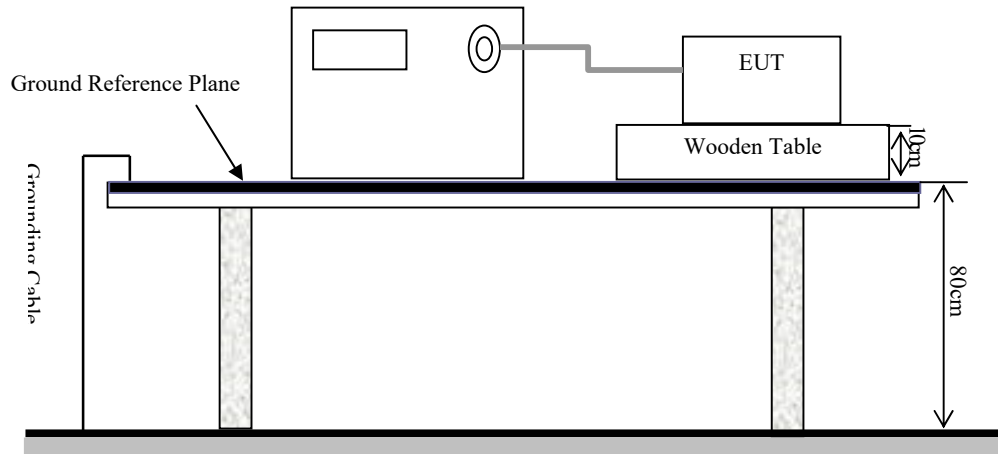
Test Level	Voltage dip and short interruptions (%) Residual	Duration (in period)	Performance criterion
1	0	0.5	B
2	0	1	B
3	70	25	B
4	0	250	C

3.8.3 Test Procedure

- 1) The interruption is introduced at selected phase angles with specified duration.
- 2) Record any degradation of performance.

3.9 Surges

3.9.1 Test System Setup



3.9.2 Test Level:

Level	Open Circuit Output Test Voltage $\pm 10\%$
1	0.5 kV
2	1 kV
3	2 kV
4	4 kV
X	Special

Performance Criterion: B

3.9.3 Test Procedure

- 1) For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).
- 2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 3) Different phase angles are done individually.
- 4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

4. TEST DATA AND RESULTS

4.1 Enclosure of Ancillary Equipment Measured on A Stand Alone Basis

Serial Number:	2FJR-2	Test Date:	2024/1/11~2024/1/15
Test Site:	966-1, 966-2	Test Mode:	Operating
Tester:	Carl Xue, coco Tian	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.5~25.9	Relative Humidity: (%)	44~57	ATM Pressure: (kPa)	101.4~101.5
----------------------	-----------	---------------------------	-------	------------------------	-------------

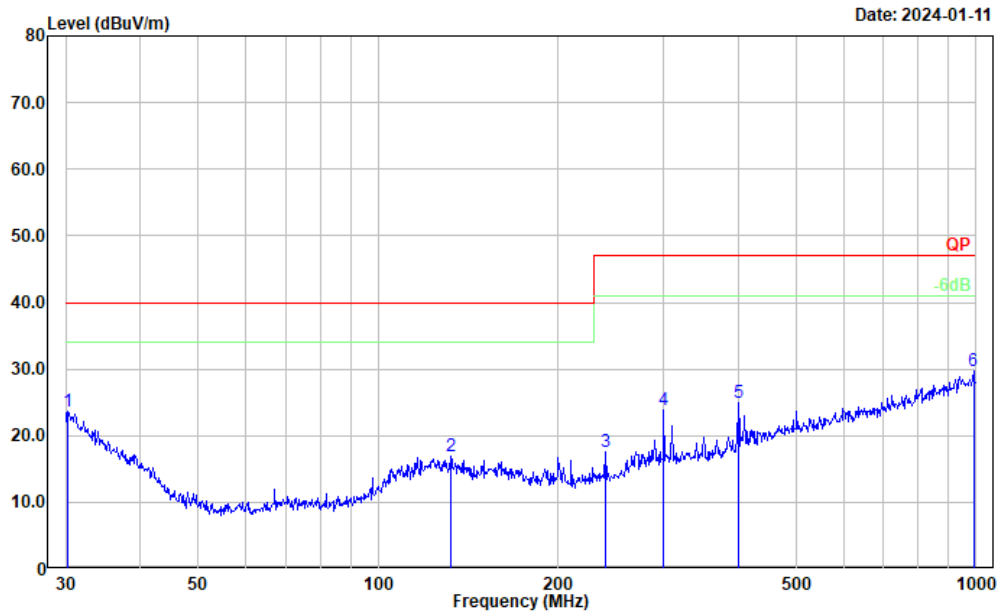
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emissions Below 1GHz					
Sunol Sciences	Antenna	JB6	A082520-5	2023/12/1	2026/11/30
R&S	EMI Test Receiver	ESR3	102724	2023/3/31	2024/3/30
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2023/7/16	2024/7/15
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2023/7/16	2024/7/15
Sonoma	Amplifier	310N	186165	2023/7/16	2024/7/15
Audix	Test Software	E3	201021 (V9)	N/A	N/A
Radiated Emissions Above 1GHz					
AH	Double Ridge Guide Horn Antenna	SAS-571	1394	2023/2/22	2026/2/21
R&S	Spectrum Analyzer	FSV40	101591	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2023/8/6	2024/8/5
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2023/8/6	2024/8/5
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2023/11/8	2024/11/7
Audix	Test Software	E3	201021 (V9)	N/A	N/A
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2023/8/6	2024/8/5
Mini Circuits	High Pass Filter	VHF-6010+	31119	2023/8/6	2024/8/5

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

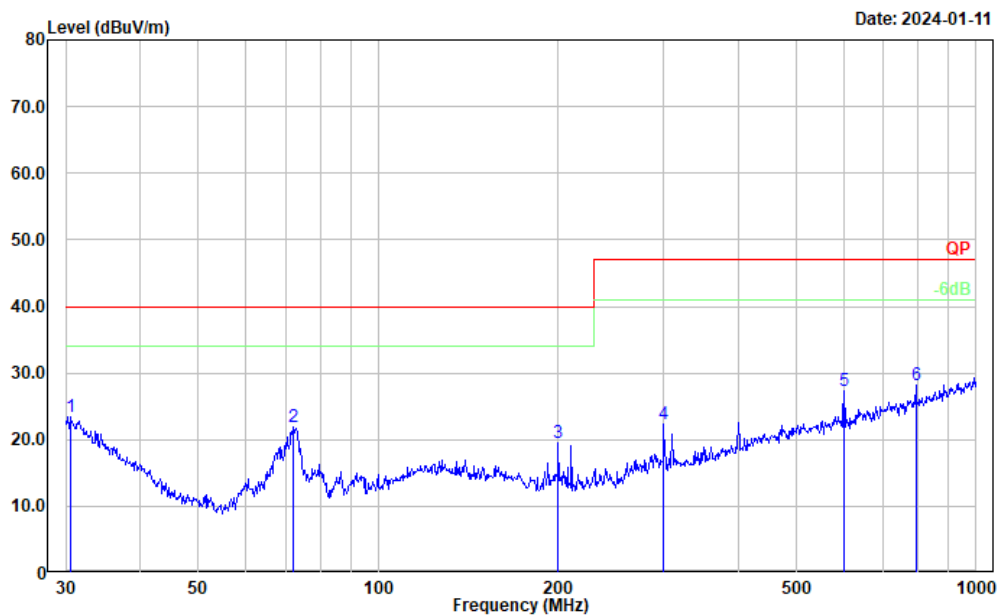
1) 30MHz-1GHz:

Project No.: CR231277022-RF
Tester: Carl Xue
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.211	27.73	-4.00	23.73	40.00	16.27	Peak
2	132.221	28.28	-11.37	16.91	40.00	23.09	Peak
3	239.987	30.29	-12.80	17.49	47.00	29.51	Peak
4	300.367	34.35	-10.42	23.93	47.00	23.07	Peak
5	400.432	32.91	-8.07	24.84	47.00	22.16	Peak
6	989.536	28.15	1.65	29.80	47.00	17.20	Peak

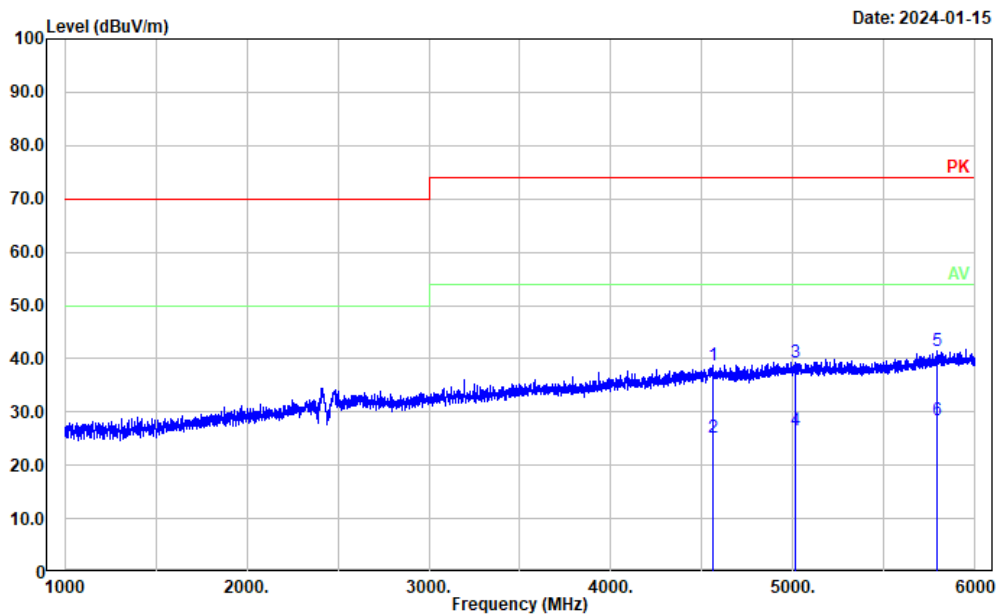
Project No.: CR231277022-RF
Tester: Carl Xue
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	30.531	27.63	-4.18	23.45	40.00	16.55	Peak
2	72.084	39.03	-17.18	21.85	40.00	18.15	Peak
3	199.986	31.74	-12.33	19.41	40.00	20.59	Peak
4	300.367	32.85	-10.42	22.43	47.00	24.57	Peak
5	601.427	31.80	-4.46	27.34	47.00	19.66	Peak
6	793.396	29.72	-1.46	28.26	47.00	18.74	Peak

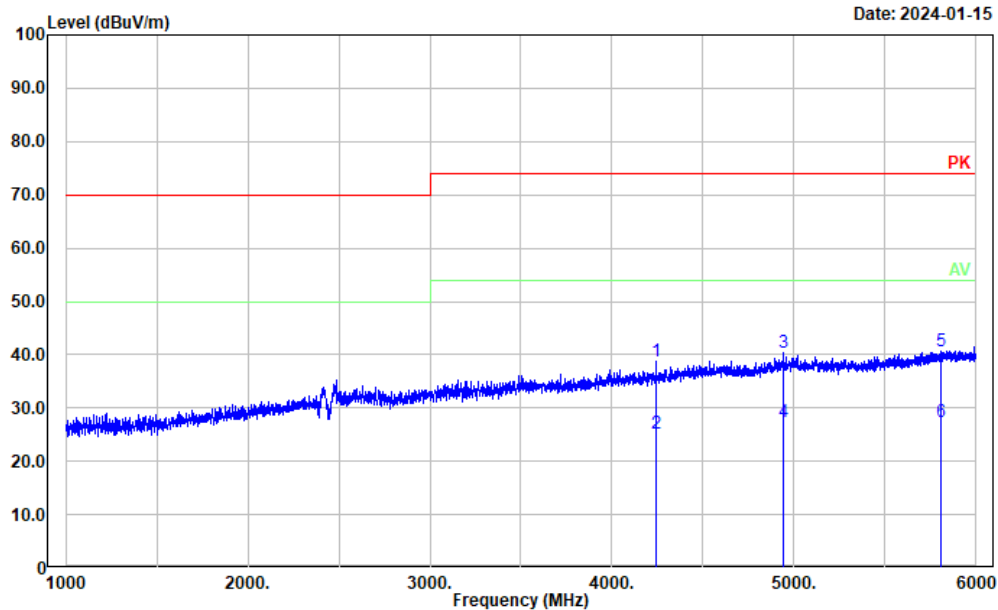
2) Above 1GHz:

Project No.: CR231277022-RF
Tester: coco Tian
Polarization: horizontal
Note: Operating



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	4558.000	34.70	4.07	38.77	74.00	35.23	Peak
2	4558.000	21.04	4.07	25.11	54.00	28.89	Average
3	5013.000	33.55	5.73	39.28	74.00	34.72	Peak
4	5013.000	20.78	5.73	26.51	54.00	27.49	Average
5	5790.000	34.76	6.64	41.40	74.00	32.60	Peak
6	5790.000	21.70	6.64	28.34	54.00	25.66	Average

Project No.: CR231277022-RF
Tester: coco Tian
Polarization: vertical
Note: Operating



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	4243.000	35.83	2.98	38.81	74.00	35.19	Peak
2	4243.000	22.33	2.98	25.31	54.00	28.69	Average
3	4938.000	34.56	5.70	40.26	74.00	33.74	Peak
4	4938.000	21.68	5.70	27.38	54.00	26.62	Average
5	5803.000	34.09	6.66	40.75	74.00	33.25	Peak
6	5803.000	20.77	6.66	27.43	54.00	26.57	Average

4.2 AC Mains Power Input/Output Ports

Serial Number:	2FJR-3	Test Date:	2024/1/16
Test Site:	CE	Test Mode:	Operating
Tester:	David Huang	Test Result:	Pass

Environmental Conditions:

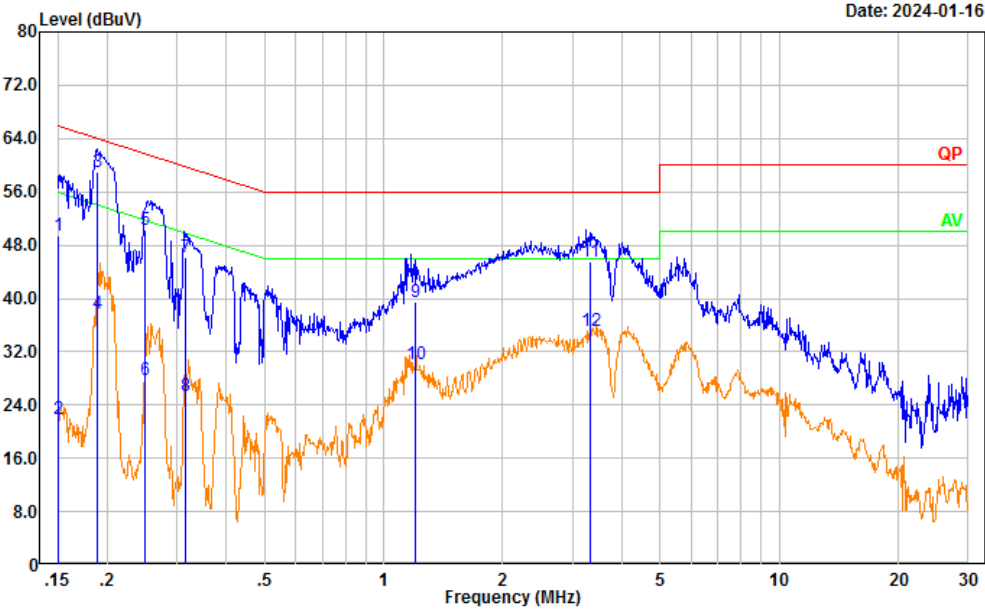
Temperature: (°C)	25.9	Relative Humidity: (%)	45	ATM Pressure: (kPa)	101.6
----------------------	------	---------------------------	----	------------------------	-------

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101134	2023/3/31	2024/3/30
R&S	EMI Test Receiver	ESR3	102726	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2023/8/6	2024/8/5
Audix	Test Software	E3	190306 (V9)	N/A	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Project No.: CR231277022-RF
Tester: David Huang
Port: Line
Note: Operating



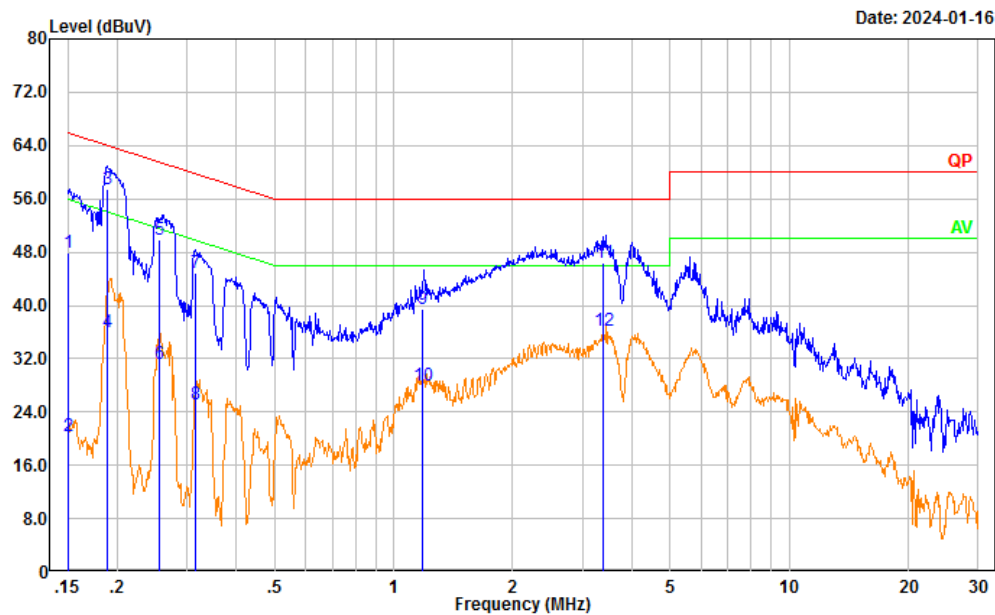
No.	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	39.89	9.61	49.50	66.00	16.50	QP
2	0.150	12.38	9.61	21.99	56.00	34.01	Average
3	0.189	49.37	9.61	58.98	64.10	5.12	QP
4	0.189	28.07	9.61	37.68	54.10	16.42	Average
5	0.250	40.62	9.61	50.23	61.75	11.52	QP
6	0.250	18.21	9.61	27.82	51.75	23.93	Average
7	0.316	36.55	9.61	46.16	59.81	13.65	QP
8	0.316	15.71	9.61	25.32	49.81	24.49	Average
9	1.205	29.74	9.62	39.36	56.00	16.64	QP
10	1.205	20.54	9.62	30.16	46.00	15.84	Average
11	3.322	35.92	9.65	45.57	56.00	10.43	QP
12	3.322	25.39	9.65	35.04	46.00	10.96	Average

Project No.: CR231277022-RF

Tester: David Huang

Port: neutral

Note: Operating



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.150	38.31	9.61	47.92	65.98	18.06	QP
2	0.150	10.70	9.61	20.31	55.98	35.67	Average
3	0.188	47.92	9.61	57.53	64.11	6.58	QP
4	0.188	26.33	9.61	35.94	54.11	18.17	Average
5	0.256	40.24	9.61	49.85	61.56	11.71	QP
6	0.256	21.66	9.61	31.27	51.56	20.29	Average
7	0.317	35.30	9.61	44.91	59.80	14.89	QP
8	0.317	15.59	9.61	25.20	49.80	24.60	Average
9	1.180	29.74	9.62	39.36	56.00	16.64	QP
10	1.180	18.28	9.62	27.90	46.00	18.10	Average
11	3.390	36.71	9.65	46.36	56.00	9.64	QP
12	3.390	26.59	9.65	36.24	46.00	9.76	Average

4.3 Radio Frequency Electromagnetic Fields (80 MHz to 6 000 MHz)

Serial Number:	2FJR-3	Test Date:	2024/1/13
Test Site:	RS	Test Mode:	Operating
Tester:	Arvin Chen	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	22.3	Relative Humidity: (%)	49	ATM Pressure: (kPa)	101.3
----------------------	------	---------------------------	----	------------------------	-------

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AR	Antenna	ATL80M1G	0351400	N/A	N/A
AR	Antenna	ATT700M12G	349410	N/A	N/A
HP	Signal Generator	8665B	3438a00584	2023/10/18	2024/10/17
AR	Power Amplifier	500W1000C	0353561	N/A	N/A
AR	Power Amplifier	60S1G6	0348711	N/A	N/A
PASTERNAK	Dual Directional Coupler	PE2239-30	1711	2023/7/15	2024/7/14
Agilent	Power Meter	E4419B	MY45103907	2023/10/18	2024/10/17
Agilent	E-Series Avg Power Sensor	E9301A	MY41497625	2023/10/18	2024/10/17
Agilent	E-Series Avg Power Sensor	E9301A	MY41497628	2023/10/18	2024/10/17

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test data**Test Mode: Operating****Note:**

Condition of Test	Remarks
Field Strength	3 V/m
RF Signal	1 kHz, 80% AM, sine wave
Sweep Frequency Step	1 %, logarithmic
Dwell Time	1 Sec

Table 1: for Bluetooth Link mode

Frequency Range (MHz)	Front Side		Rear Side		Left Side		Right Side		Top Side		Bottom Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A	A	A	A	A
1000-6000	A	A	A	A	A	A	A	A	A	A	A	A
Required Performance Criteria: A Description of Performance Reduction: N/A												
Note: “A” stands for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.												

Table 2: for Radar mode

Frequency Range (MHz)	Front Side		Rear Side		Left Side		Right Side		Top Side		Bottom Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A	A	A	A	A
1000-6000	A	A	A	A	A	A	A	A	A	A	A	A
Required Performance Criteria: A Description of Performance Reduction: N/A												
Note: “A” stands for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.												

4.4 Electrostatic Discharges

Serial Number:	2FJR-3	Test Date:	2024/1/13
Test Site:	ESD	Test Mode:	Operating
Tester:	Arvin Chen	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	23.9	Relative Humidity: (%)	49	ATM Pressure: (kPa)	101.3
----------------------	------	---------------------------	----	------------------------	-------

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TESEQ	ESD Generator	NSG 438	1019	2023/11/16	2024/11/15

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test data**Test Mode: Operating****Test Data:****Table 1: Electrostatic Discharge Immunity (Indirect Contact HCP)**

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/
Top Side	A	A	A	A	/	/	/	/
Bottom Side	A	A	A	A	/	/	/	/
Required Performance Criteria: B								
Description of Performance Reduction: N/A								

Table 2: Electrostatic Discharge Immunity (Indirect Contact VCP)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/
Required Performance Criteria: B								
Description of Performance Reduction: N/A								

4.5 Fast Transients, Common Mode

Serial Number:	2FJR-3	Test Date:	2024/1/13
Test Site:	EFT	Test Mode:	Operating
Tester:	Arvin Chen	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.9	Relative Humidity: (%)	36	ATM Pressure: (kPa)	101.3
----------------------	------	---------------------------	----	------------------------	-------

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EM TEST	EMS Comprehensive Tester	Compact NX5	P1850225473	2023/9/4	2024/9/3
EM TEST	AC Autotransformer	MV2616	P1401128614	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:**AC Mains Power Input Ports**

Test Line	Test Level (kV)							
	+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
L	A	A	A	A	/	/	/	/
N	A	A	A	A	/	/	/	/
Earth	/	/	/	/	/	/	/	/
L+N	A	A	A	A	/	/	/	/
L + Earth	/	/	/	/	/	/	/	/
N + Earth	/	/	/	/	/	/	/	/
L+N+Earth	/	/	/	/	/	/	/	/
Required Performance Criteria: B								
Description of Performance Reduction: N/A								

4.6 Radio Frequency, Common Mode

Serial Number:	2FJR-3	Test Date:	2024/1/13
Test Site:	CS	Test Mode:	Operating
Tester:	Arvin Chen	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	243.6	Relative Humidity: (%)	45	ATM Pressure: (kPa)	101.3
----------------------	-------	---------------------------	----	------------------------	-------

Test Equipment List and Details:

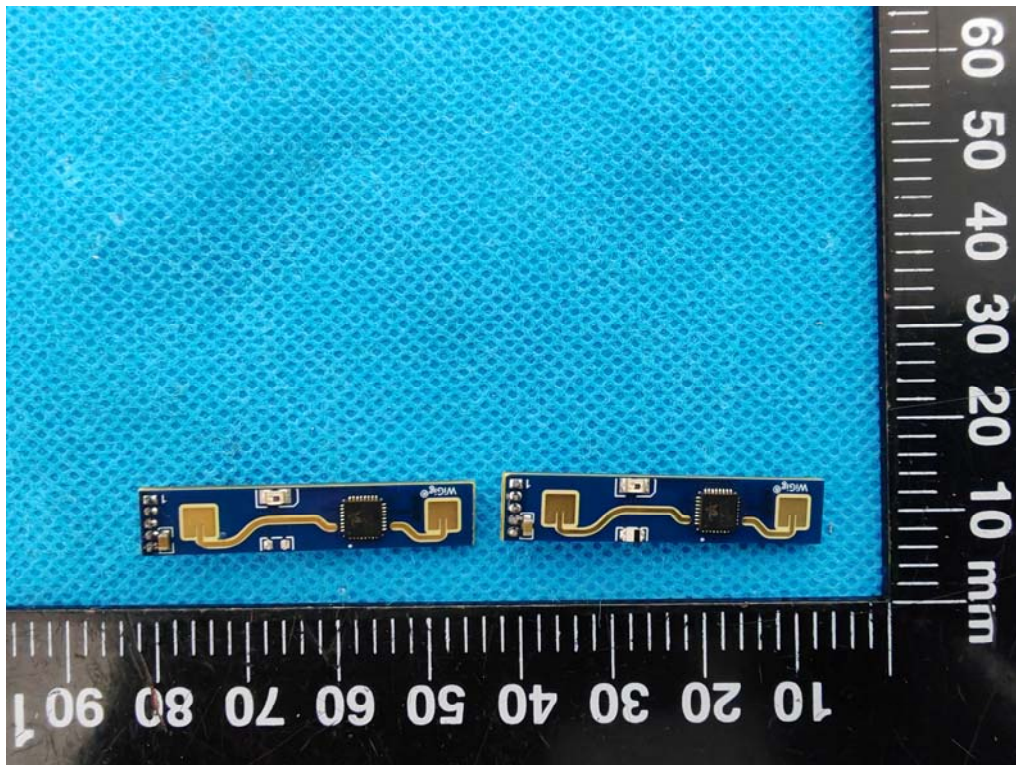
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Signal Generator	8648A	3426A00831	2023/10/18	2024/10/17
AR	Power Amplifier	15A250	12934	N/A	N/A
Werlatone	Dual Directional Coupler	C5091-10	113192	2023/2/9	2024/2/8
NARDA	Attenuator	769-6	02754	N/A	N/A
HP	Power Meter	EPM-441A	GB37481494	2023/10/19	2024/10/18
Agilent	Power sensor	8482A	US37296108	2023/10/18	2024/10/17
COM-POWER	CDN	M325E	521064	2023/8/18	2024/8/17

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

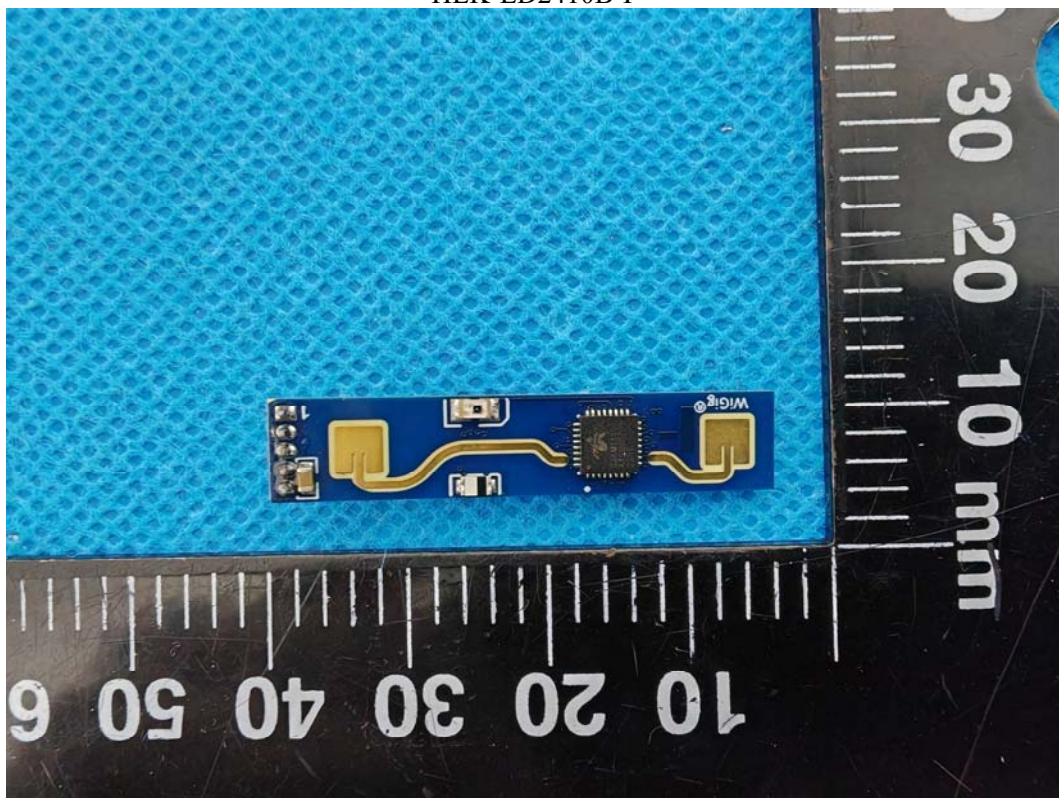
Test Data**Test Mode: Operating****Note:****Table 1:AC Mains Power Input Port**

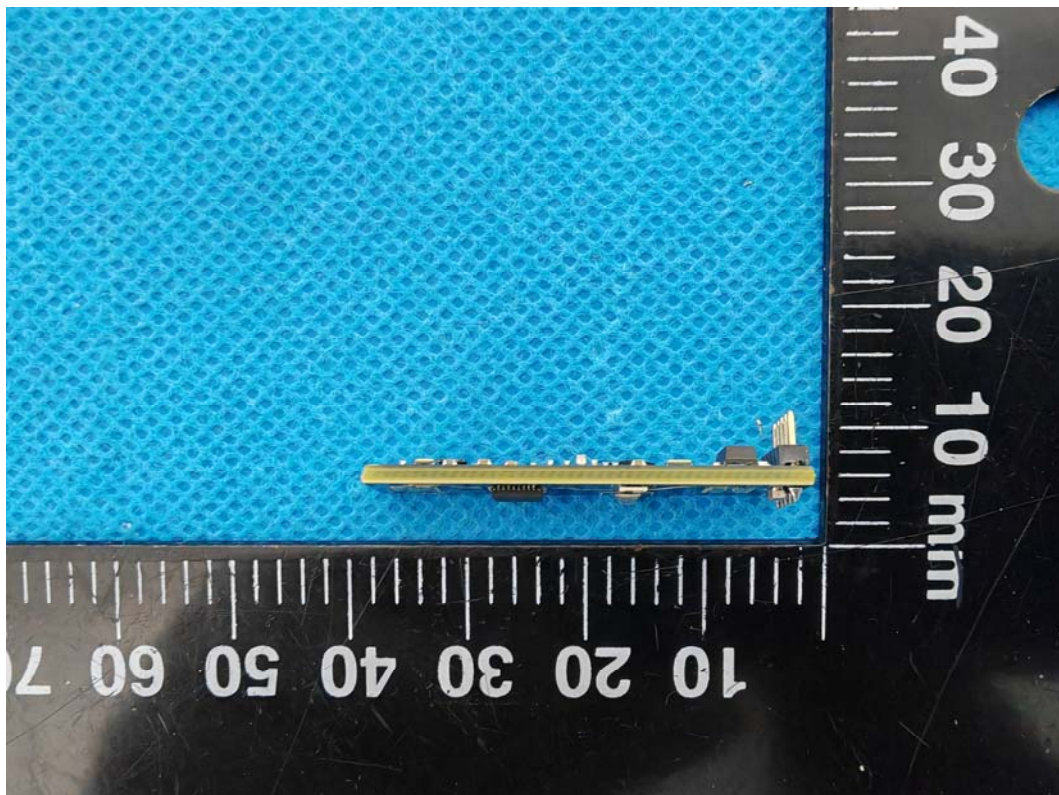
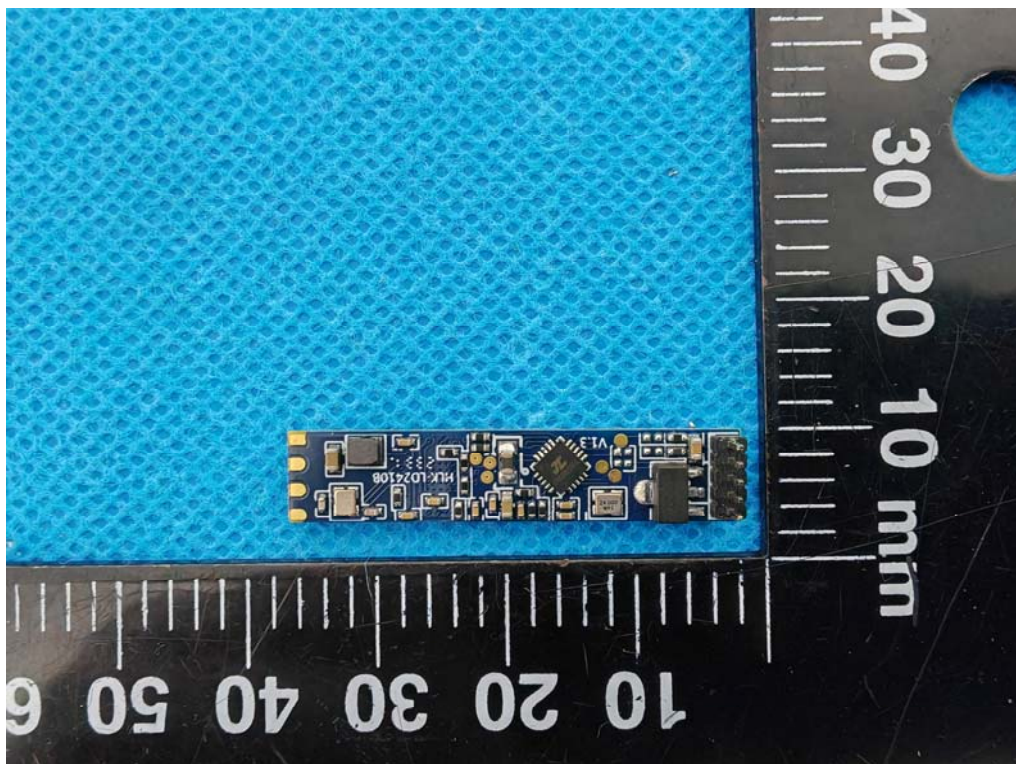
Signal Type	Frequency Range (MHz)	Voltage Level (r.m.s.)	Perform Criterion
Modulation: Amplitude 80%, 1kHz sine wave Dwell Time 1_Sec	0.15-80	3V	A
Required Performance Criteria: A			
Description of Performance Reduction: N/A			

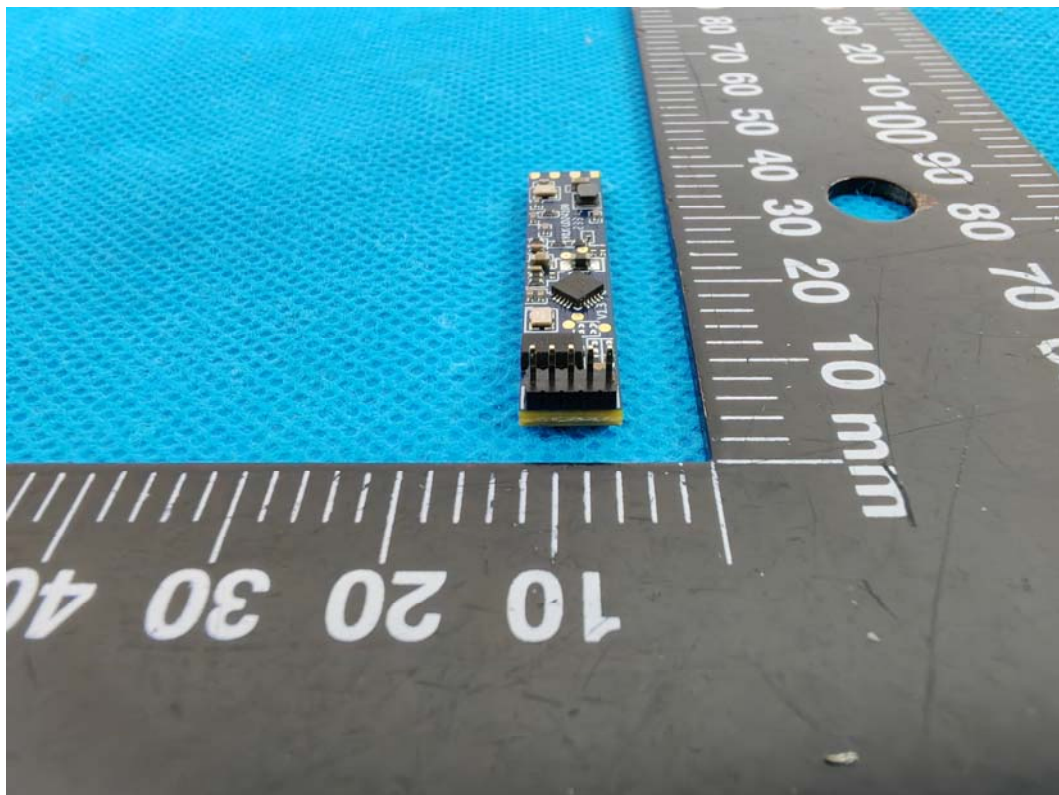
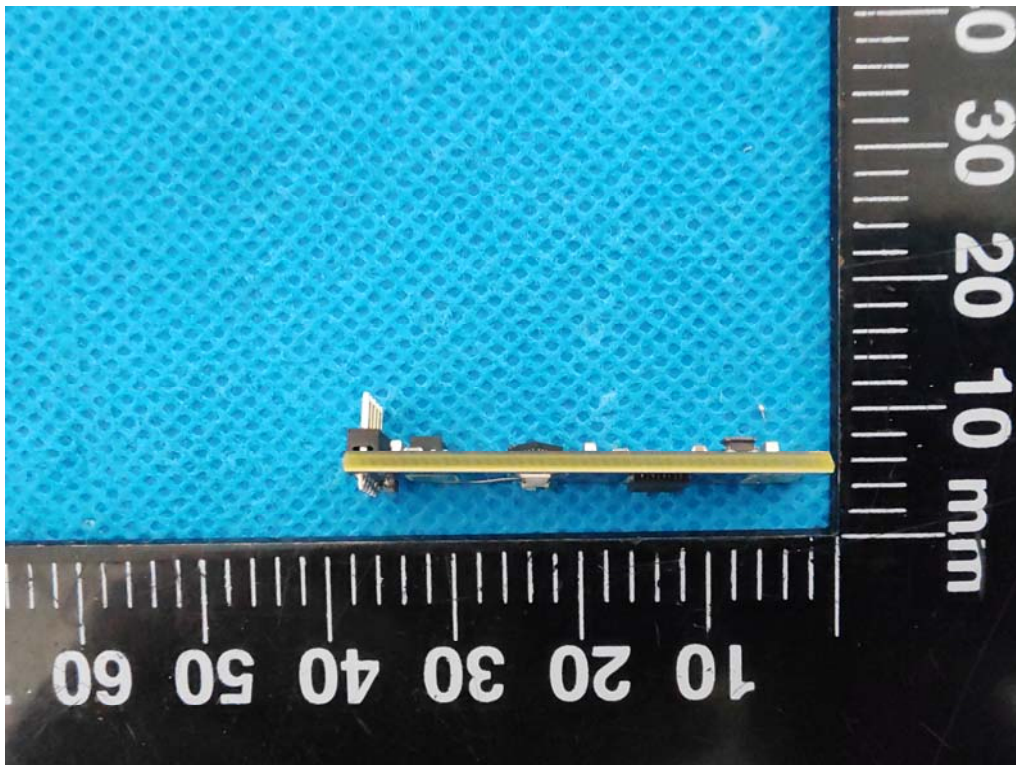
5. EUT PHOTOGRAPHS

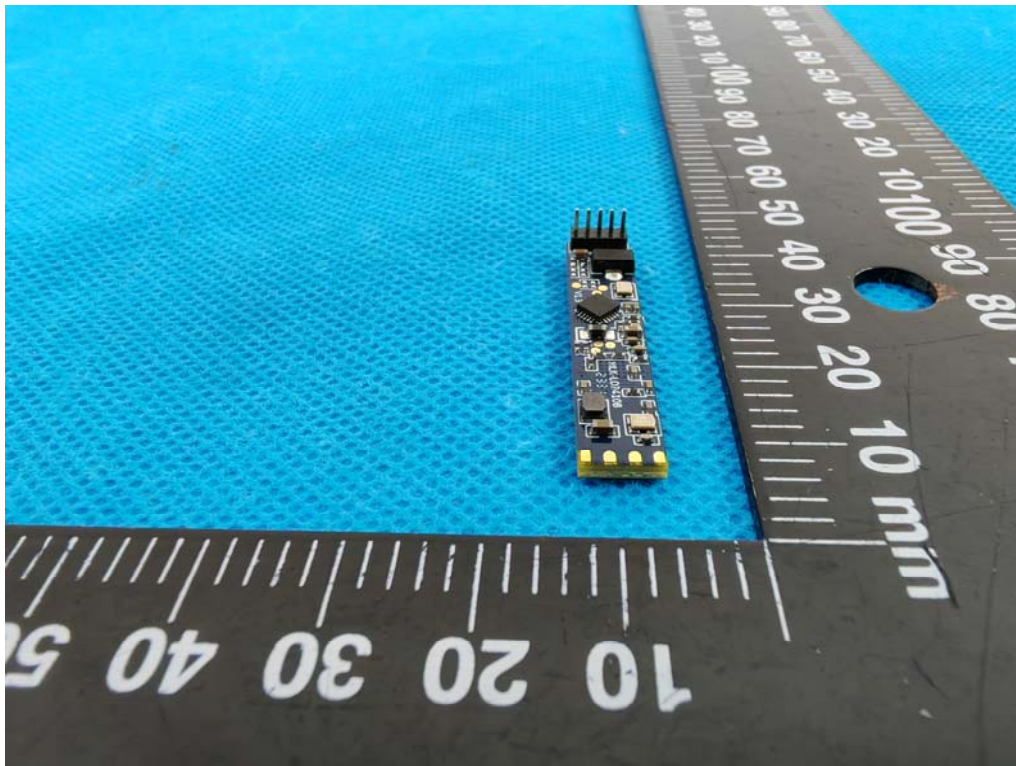


HLK-LD2410B-P

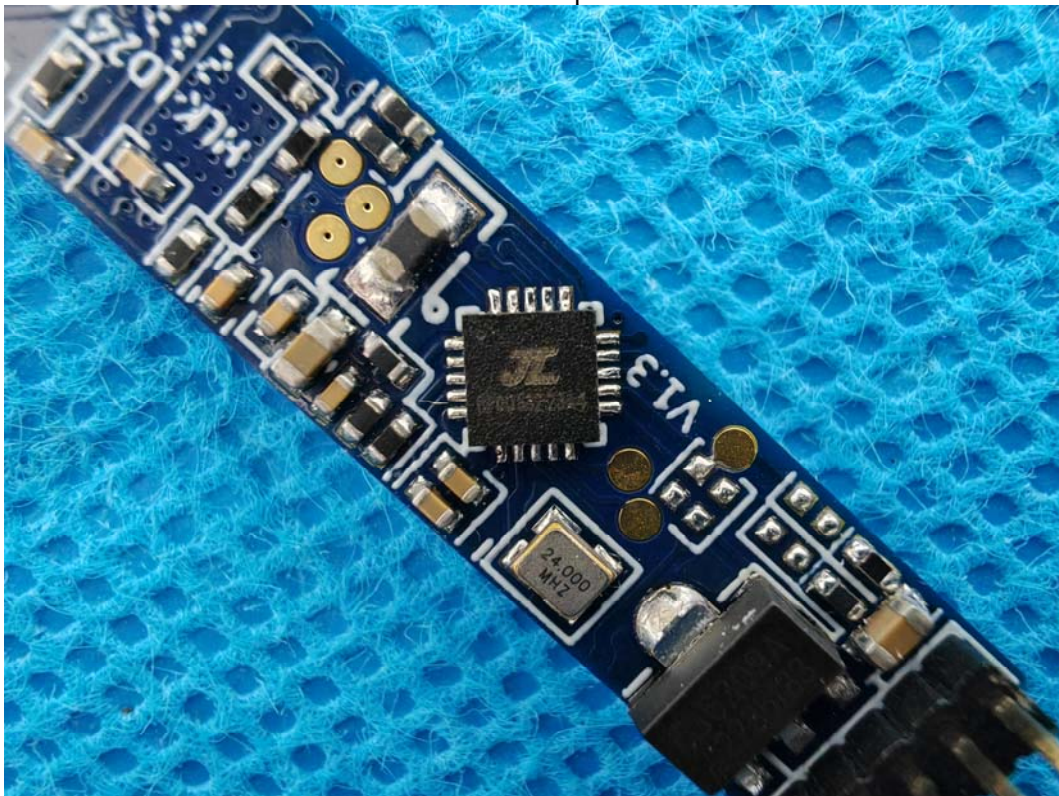




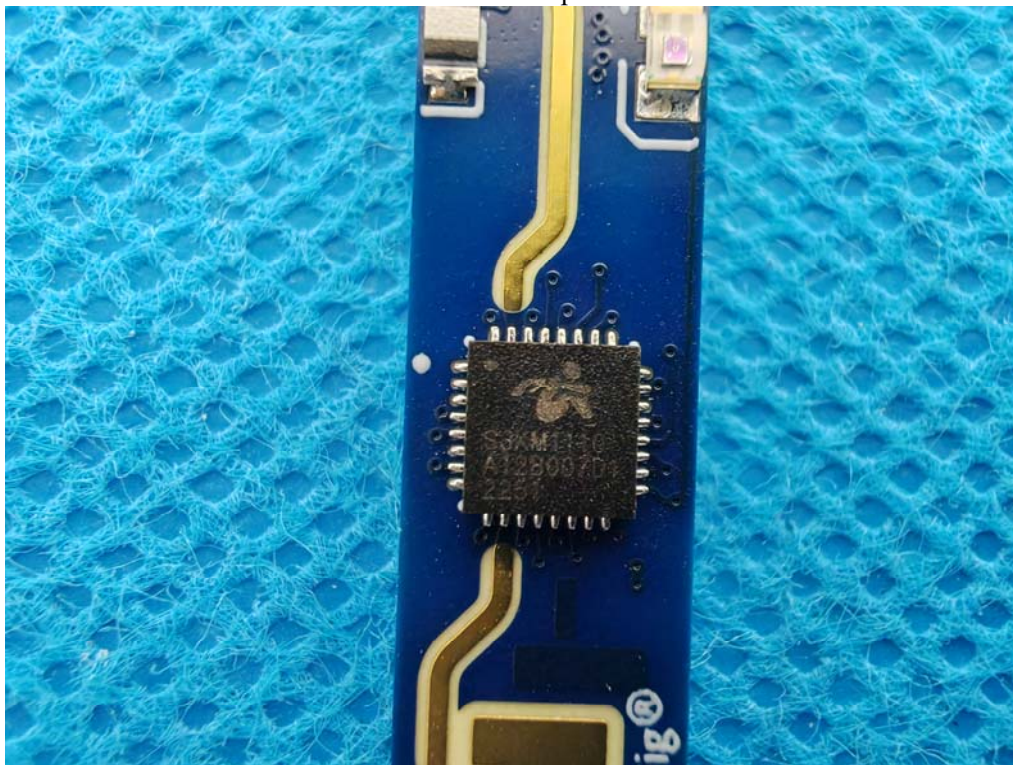




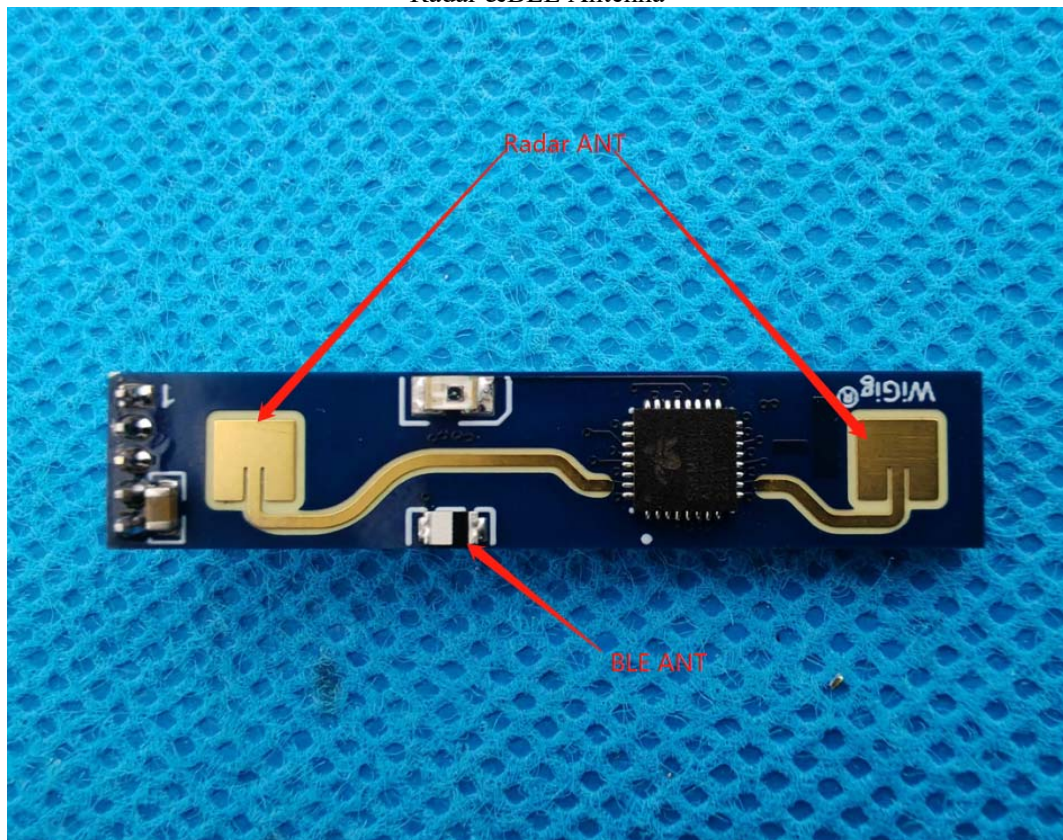
BLE chip



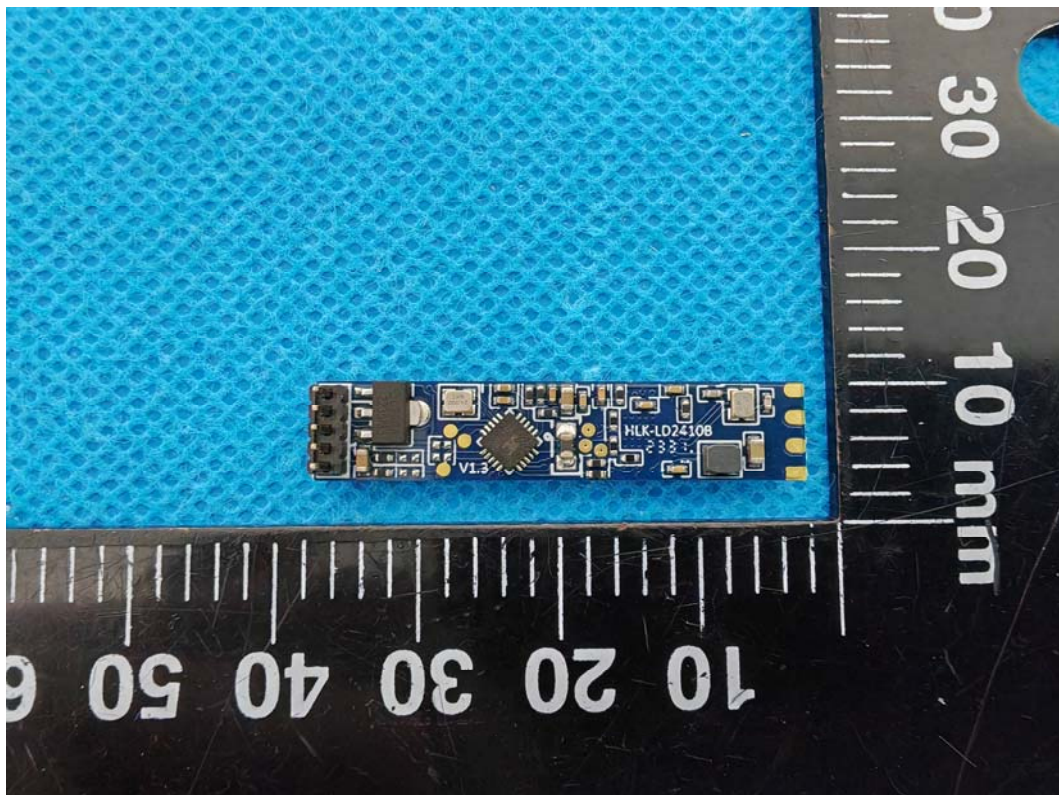
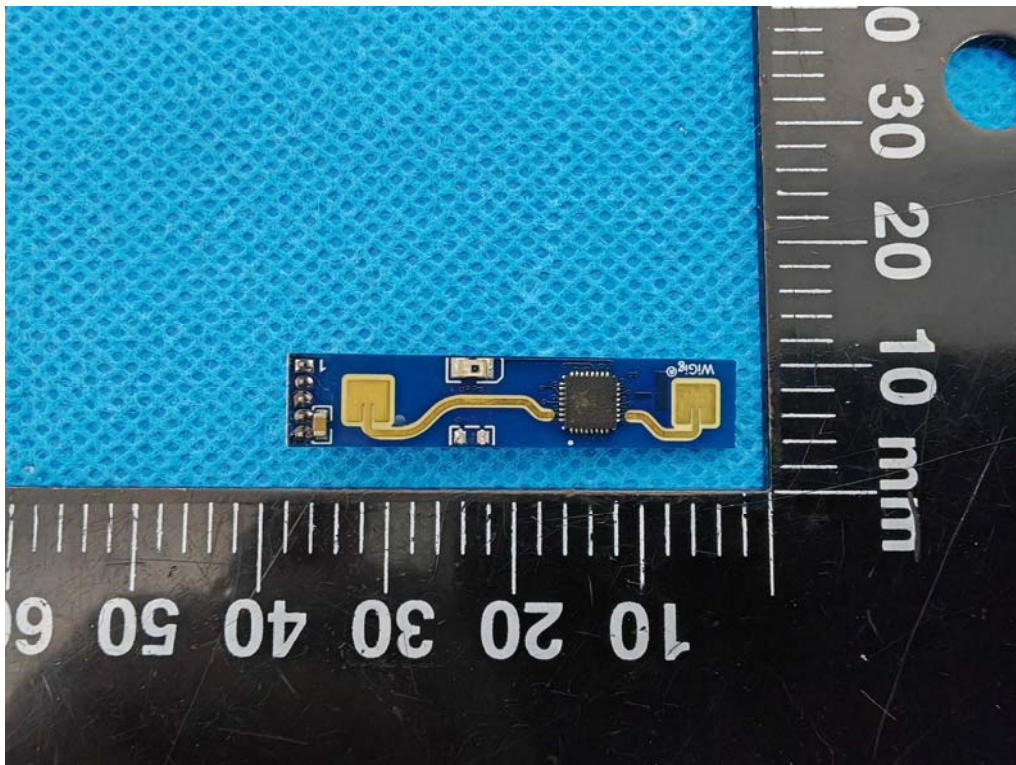
Radar chip

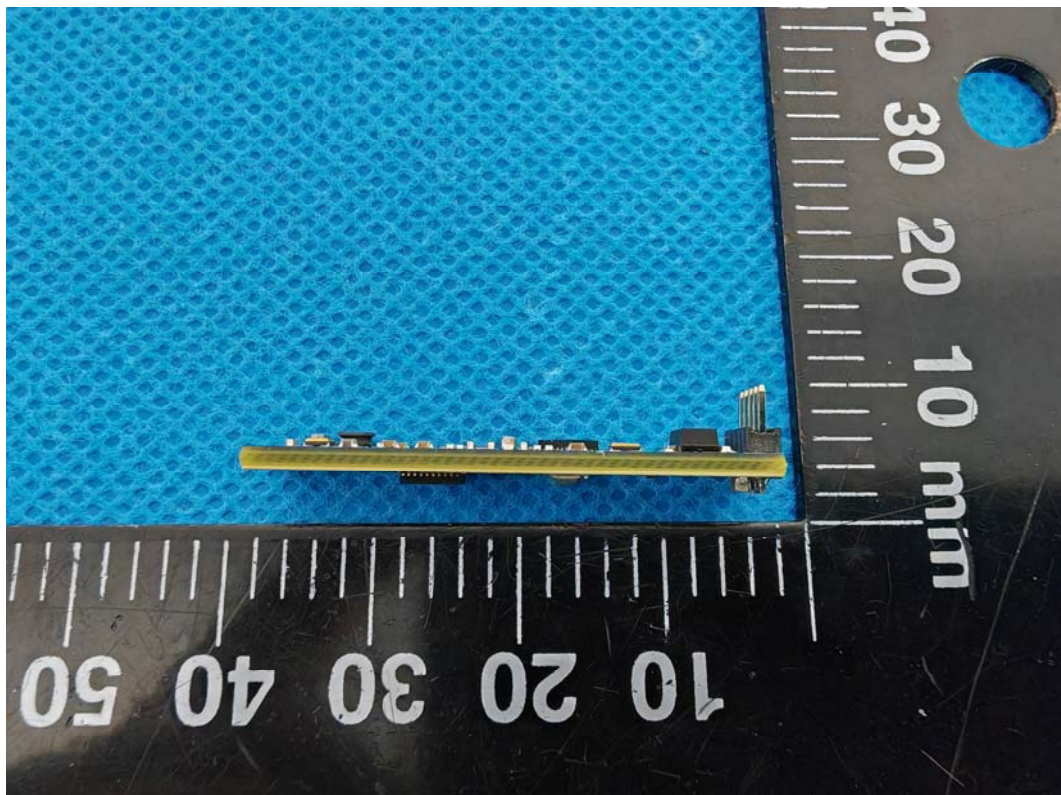
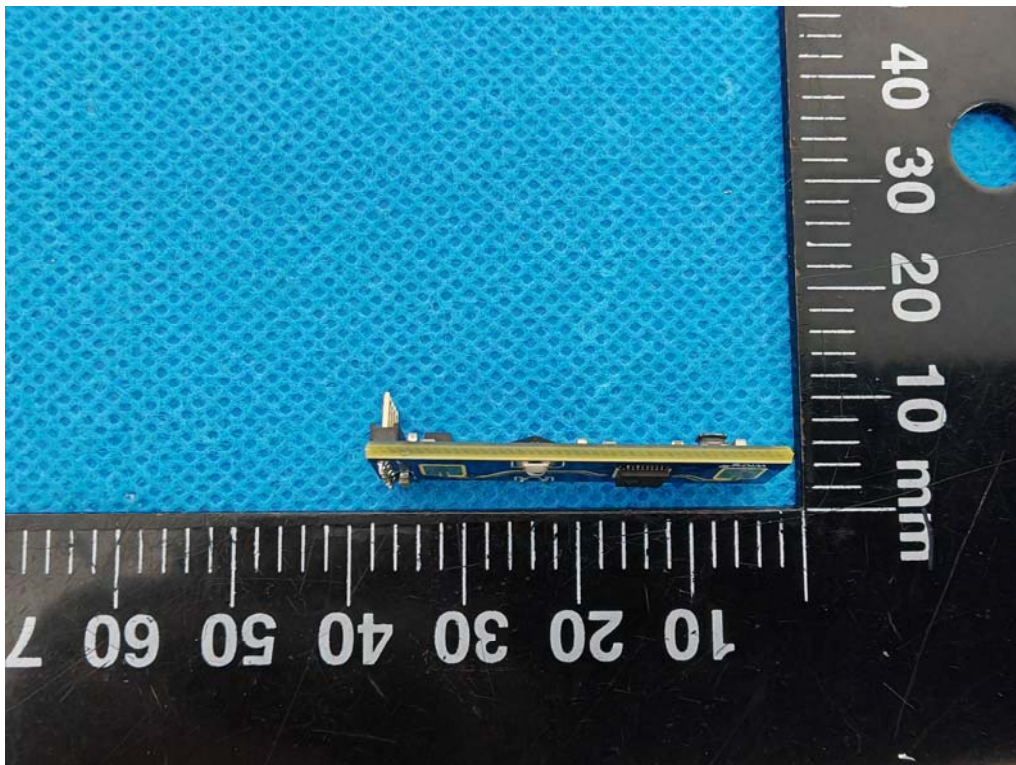


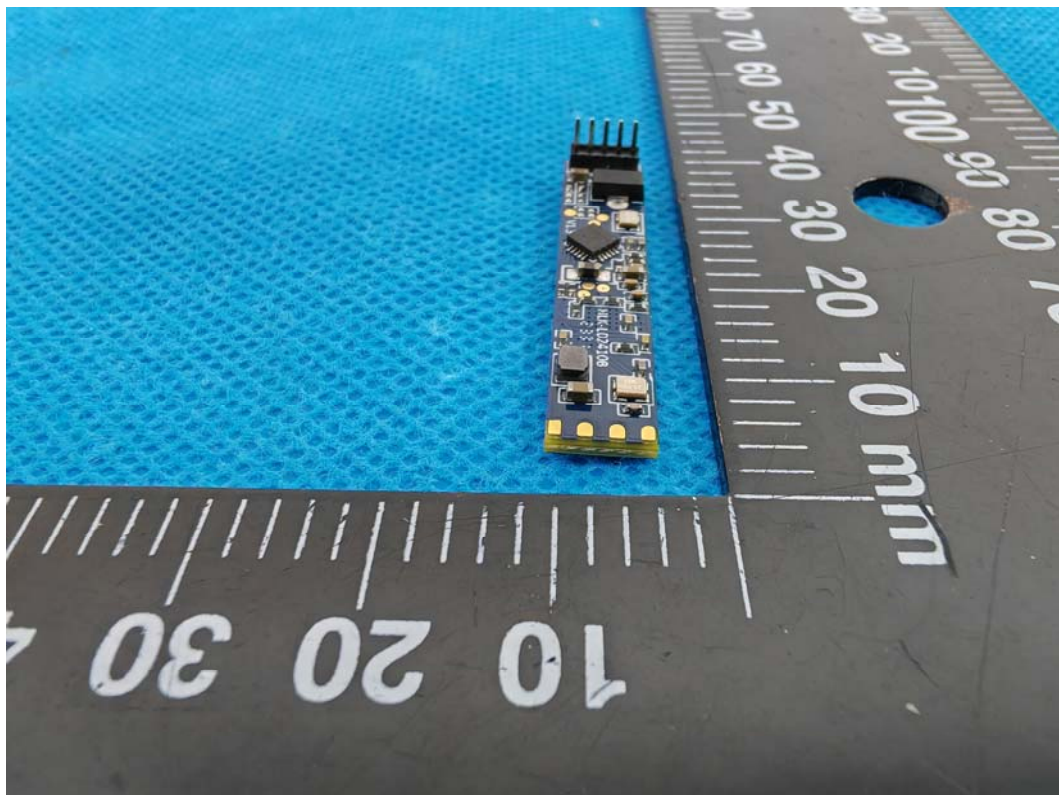
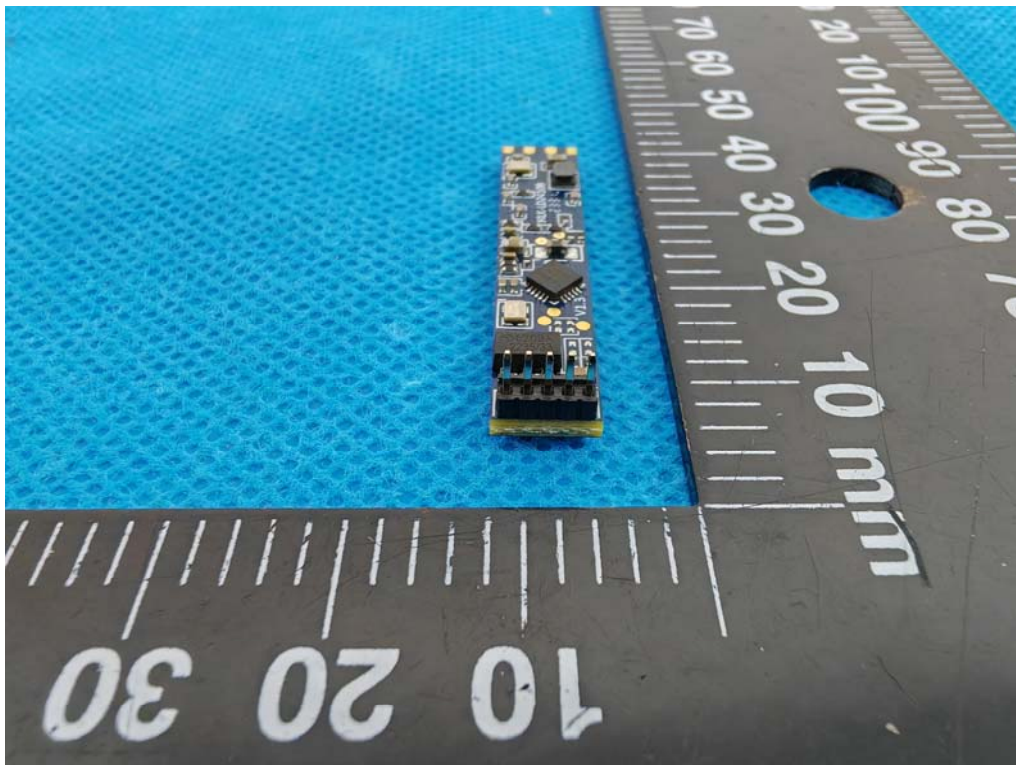
Radar & BLE Antenna



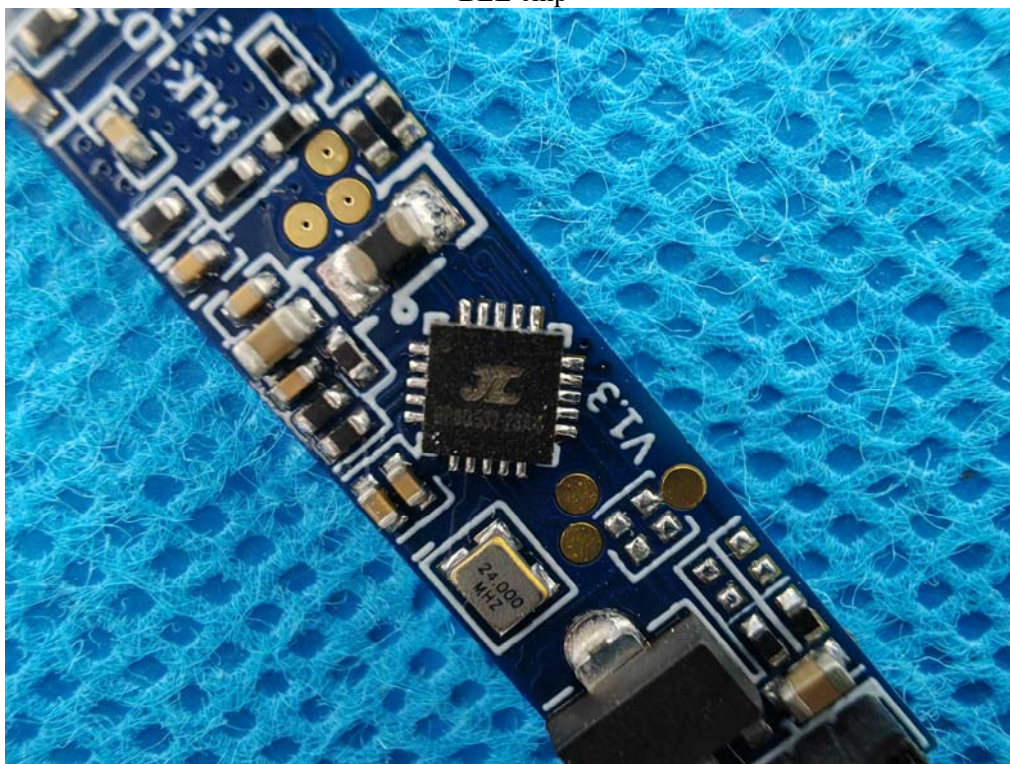
HLK-LD2410-P



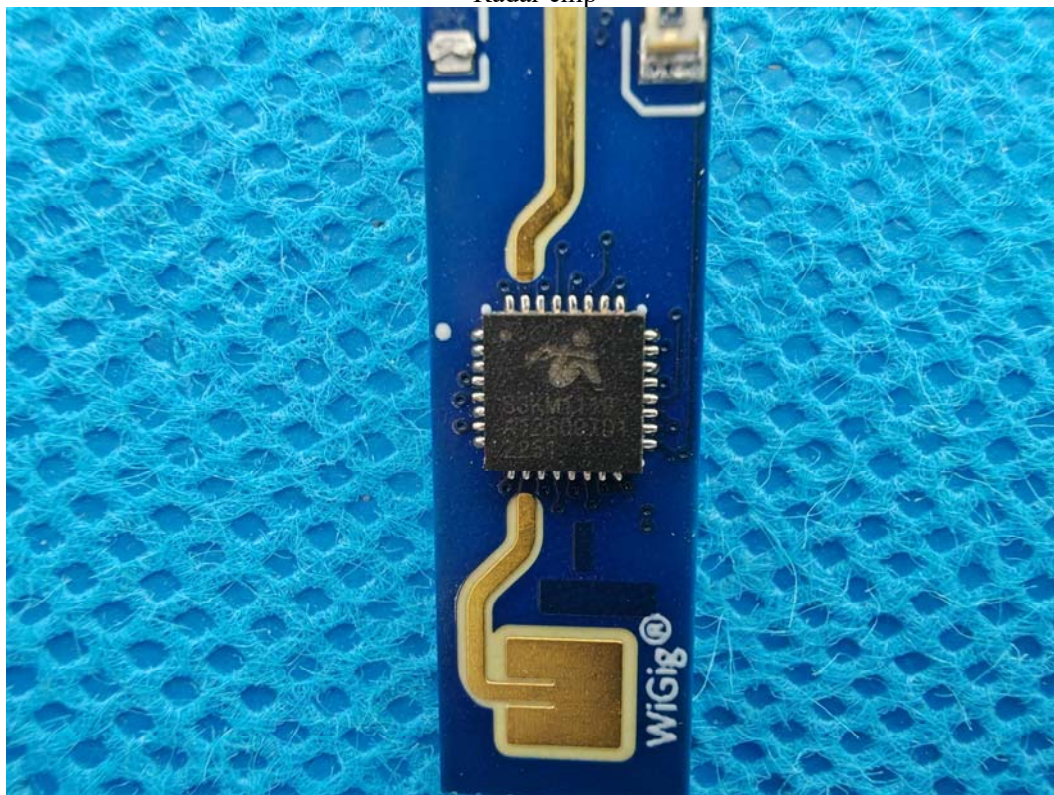




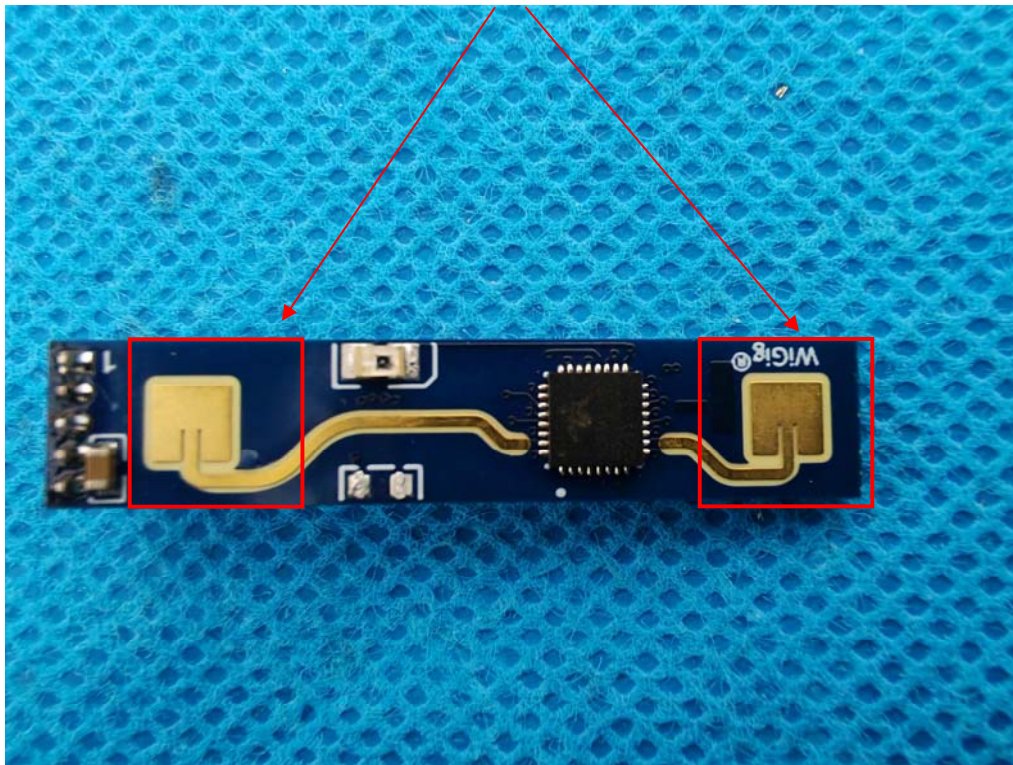
BLE chip



Radar chip



Radar Antenna



6. TEST SETUP PHOTOGRAPHS

RE

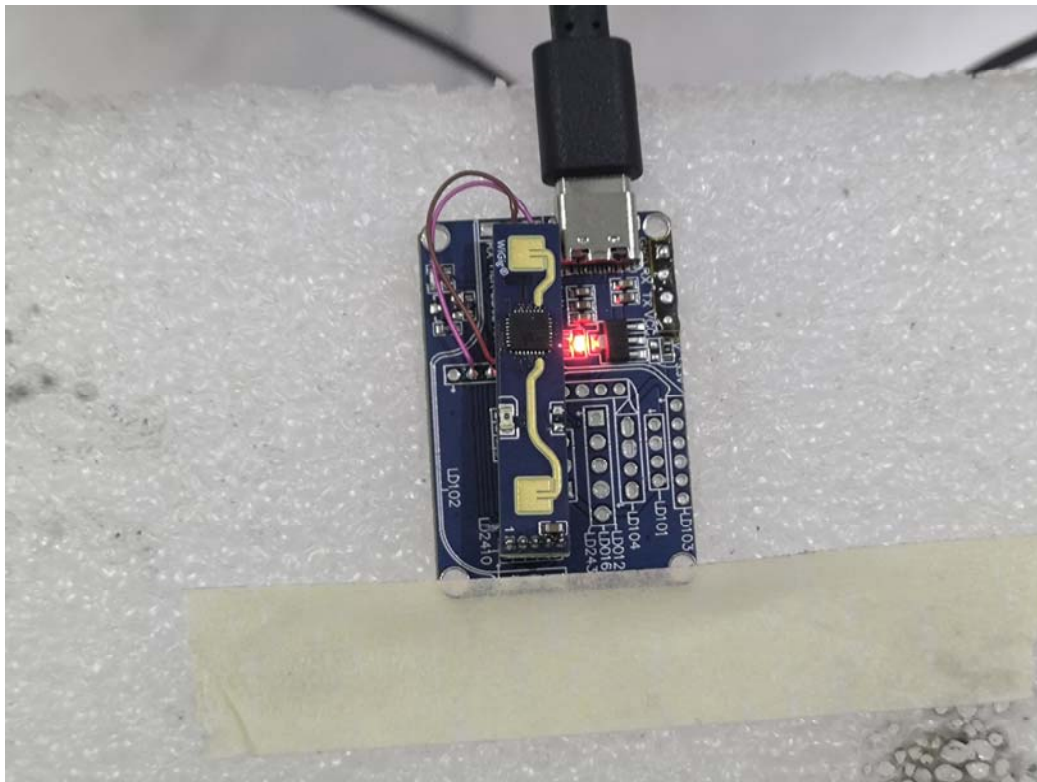
RE Below 1GHz front View



RE Below 1GHz rear View



RE Below 1GHz View



RE Above 1GHz front View



RE Above 1GHz rear View



RE Above 1GHz View



CE_AC

CE front View



CE side View



RS

Test Setup Photo View



ESD

Test Setup Photo View



EFT

Test Setup Photo View



CS

Test Setup Photo View



===== END OF REPORT =====