Zhongshan City Richsound Electronic Industrial Ltd.

TEST REPORT

SCOPE OF WORK
FCC TESTING– MODEL: AX5100Q, R652, A652, AX5100QAU, AX3100Q, R632, A632, AX3100QAU, TS5100Q, TS3100Q

REPORT NUMBER
240627033SZN-002

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23 July 2024

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27

DOCUMENT CONTROL NUMBER
FCC ID 249_C

Zhongshan City Richsound Electronic Industrial Ltd.

Application for Certification

FCC ID: Z8M-AX5100Q

5.1 CH Soundbar with Wireless Subwoofer, 3.1 CH Soundbar with Wireless Subwoofer

Model: AX5100Q, R652, A652, AX5100QAU, AX3100Q, R632, A632, AX3100QAU, TS5100Q, TS3100Q

Brand Name: Hisense. , TOSHIBA

5.8GHz Transmitter

Report No.: 240627033SZN-002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-23]

Prepared and Checked by:

Vito

Vito Pan
Project Engineer

Approved by:

Peter Kang

Peter Kang
Senior Technical Supervisor
Date: 23 July 2024

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one:) Original Grant _X_ Class II Change _____

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No __X__

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No __X__

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-23 Edition] provision.

Report prepared by:

Vito Pan
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community
GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China
Tel / Fax: 86-755-8601 6752

Table of Contents

1.0 Summary of Test Result

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Applicant Address: No.16, East ShaGang Road, GangKou Town, ZhongShan City, GuangDong, 528447, China
Manufacturer: Zhongshan City Richsound Electronic Industrial Ltd.
Manufacturer Address: No.16, East ShaGang Road, GangKou Town, ZhongShan City, GuangDong, 528447, China

MODEL: AX5100Q, R652, A652, AX5100QAU, AX3100Q, R632, A632, AX3100QAU, TS5100Q, TS3100Q
FCC ID: Z8M-AX5100Q

Test Specification	Reference	Results
Transmitter Radiated Emission Band edge	15.249 &15.209 &15.205	Pass
Conducted Emission	15.207	Pass
20dB Bandwidth	15.215(c)	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a 5.1 CH Soundbar with Wireless Subwoofer with Bluetooth 5.3 EDR (Single Mode) function operating in 2402-2480MHz and 5.8GHz function operating in 5729-5849MHz. The EUT can be powered by AC 100-240V, 50/60Hz. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: GFSK
Antenna Gain: 0.26dBi (This information is provided by applicant, and the applicant is responsible for the authenticity of the provided information.)

The Model: R652. A652, AX5100QAU, TS5100Q is the same as the Model: AX5100Q in hardware and electrical aspect. The Model: R632, A632, AX3100QAU, TS3100Q is the same as the Model: AX3100Q in hardware and electrical aspect. The difference in model number, production name and trade name serve as marketing strategy. The difference between AX5100Q and AX3100Q is that AX3100Q has no surround Speaker. Please refer to the below table.

Production name	Trade name	Model No.	Description
5.1 CH Soundbar with Wireless Subwoofer	Hisense. TOSHIBA	AX5100Q, R652, A652, AX5100QAU, TS5100Q	Appearance; Soundbar + Wireless subwoofer + Wireless surround (powered by adapter)
3.1 CH Soundbar with Wireless Subwoofer	Hisense. TOSHIBA	AX3100Q, R632, A632, AX3100QAU, TS3100Q	Appearance; Soundbar +Wireless subwoofer

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of controller unit for the 5.1 CH Soundbar with Wireless Subwoofer which has 5.8G function. Other digital functions were reported in the verification report: 240627033SZN-005. For the report of another BT function was reported in report: 240627033SZN-001.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are Intertek Testing Services Shenzhen Ltd. Longhua Branch and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

3.0 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by AC 120V, 60Hz during the test, only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Section 4.

The EUT and transmitting antenna was centered on the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software

There was no special software to exercise the device.

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by Zhongshan City Richsound Electronic Industrial Ltd. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Longhua Branch.

3.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
mobile phone	Samsung (provided by Intertek)	S7
AC/DC Adapter	Shenzhen Fangxin Technology Co., Ltd. (provided by Client)	Model: FX36U-200180C Input: 100-240V~ 50/60Hz 0.8A Output: 20V 1.8A
USB Memory	SanDisk (provided by Intertek)	SDCZ36-002G-P36
Remote controller	Hisense (provided by Client)	N/A
Dummy Load	N/A (provided by Intertek)	Audio Port: 1000Ω Video Port: 75 Ω HDMI Port: 100 Ω
AUX IN Cable	N/A (provided by Intertek)	Unshielded, Length 150cm
HDMI Cable	N/A (provided by Client)	shielded, Length 155cm
Optical Cable	N/A (provided by Intertek)	Unshielded, Length 150cm
AC power cord	N/A (provided by Client)	Unshielded, Length 150cm
Surround Speaker Cable	N/A (provided by Client)	Unshielded, Length 800cm

4.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.
RA = 62.0 dBµV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBµV/m

Level in µV/m = Common Antilogarithm [(42 dBµV/m)/20] = 125.9 µV/m

4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

4.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
32.004667 MHz

Judgement: Passed by 10.9 dB

TEST PERSONNEL:

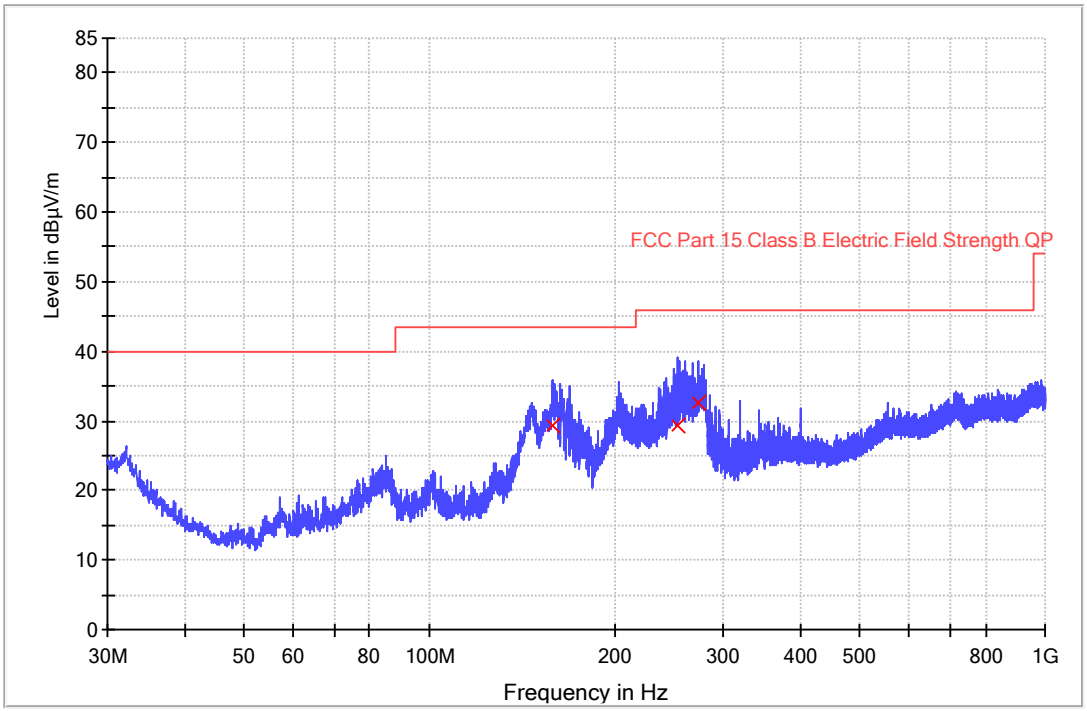
Sign on file

Vito Pan, Engineer
Typed/Printed Name

10 July 2024
Date

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 10 July 2024 Model: AX5100Q
Worst Case Operating Mode: Simultaneous Transmission
Modulation type: GFSK

ANT Polarity: Horizontal

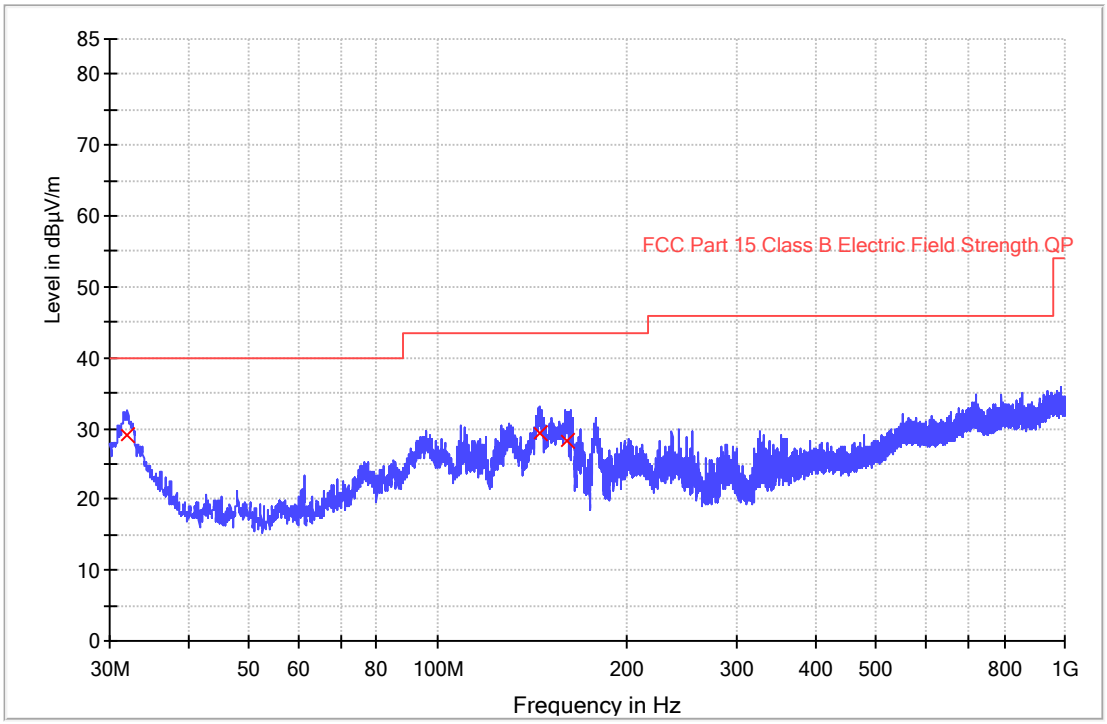


Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dBµV/m)
158.945333	29.3	1000.0	120.000	100.0	H	17.1	14.2	43.5
253.067667	29.3	1000.0	120.000	100.0	H	19.5	16.7	46.0
273.373000	32.6	1000.0	120.000	100.0	H	19.7	13.4	46.0

Remark:
1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 10 July 2024 Model: AX5100Q
Worst Case Operating Mode: Simultaneous Transmission
Modulation type: GFSK

ANT Polarity: Vertical



Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit – QPK (dBµV/m)
32.004667	29.1	1000.0	120.000	100.0	V	21.9	10.9	40.0
145.818000	29.3	1000.0	120.000	100.0	V	15.9	14.2	43.5
160.820667	28.2	1000.0	120.000	100.0	V	17.1	15.3	43.5

Remark:
1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

4.1.4 Transmitter Spurious Emissions (Radiated)

Worst Case Radiated Emission
at
5789.000 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 1.2 dB

TEST PERSONNEL:

Sign on file

Vito Pan, Engineer
Typed/Printed Name

17 July 2024
Date

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 17 July 2024 Model: AX5100Q
Worst Case Operating Mode: Transmitting

Table 1

Radiated Emissions
(5729 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5729.000	102.0	36.7	28.1	93.4	114.0	-20.6
Horizontal	11458.000	48.3	36.7	35.5	47.1	74.0	-26.9
Horizontal	17187.000	53.1	36.8	35.6	51.9	74.0	-22.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5729.000	99.5	36.7	28.1	90.9	94.0	-3.1
Horizontal	11458.000	40.4	36.7	35.5	39.2	54.0	-14.8
Horizontal	17187.000	45.6	36.8	35.6	44.4	54.0	-9.6

Notes:

1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental emission measurement).

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 17 July 2024 Model: AX5100Q
Worst Case Operating Mode: Transmitting

Table 2

Radiated Emissions
(5789 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5789.000	101.7	36.7	28.1	93.1	114.0	-20.9
Horizontal	11578.000	46.4	36.7	35.5	45.2	74.0	-28.8
Horizontal	17367.000	51.9	36.8	35.6	50.7	74.0	-23.3

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dB/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5789.000	101.4	36.7	28.1	92.8	94.0	-1.2
Horizontal	11578.000	39.0	36.7	35.5	37.8	54.0	-16.2
Horizontal	17367.000	45.0	36.8	35.6	43.8	54.0	-10.2

Notes:
1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental emission measurement).

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 17 July 2024 Model: AX5100Q
Worst Case Operating Mode: Transmitting

Table 3

Radiated Emissions
(5849 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5849.000	102.6	36.7	28.1	94.0	114.0	-20.0
Horizontal	11698.000	48.4	36.7	35.5	47.2	74.0	-26.8
Horizontal	17547.000	54.8	36.8	35.6	53.6	74.0	-20.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5849.000	101.3	36.7	28.1	92.7	94.0	-1.3
Horizontal	11698.000	39.9	36.7	35.5	38.7	54.0	-15.3
Horizontal	17547.000	47.4	36.8	35.6	46.2	54.0	-7.8

Notes:
1. Peak detector is used for the emission measurement (RBW=1MHz / VBW=3MHz for Peak value, and RBW=1MHz / VBW=10Hz for Average value; RBW=3MHz is used for fundamental emission measurement).

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

4.2 Conducted Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

4.2.1 Conducted Emission

Worst Case Conducted Configuration
at
0.158000MHz

Judgement: Passed by 11.6dB margin

TEST PERSONNEL:

Sign on file

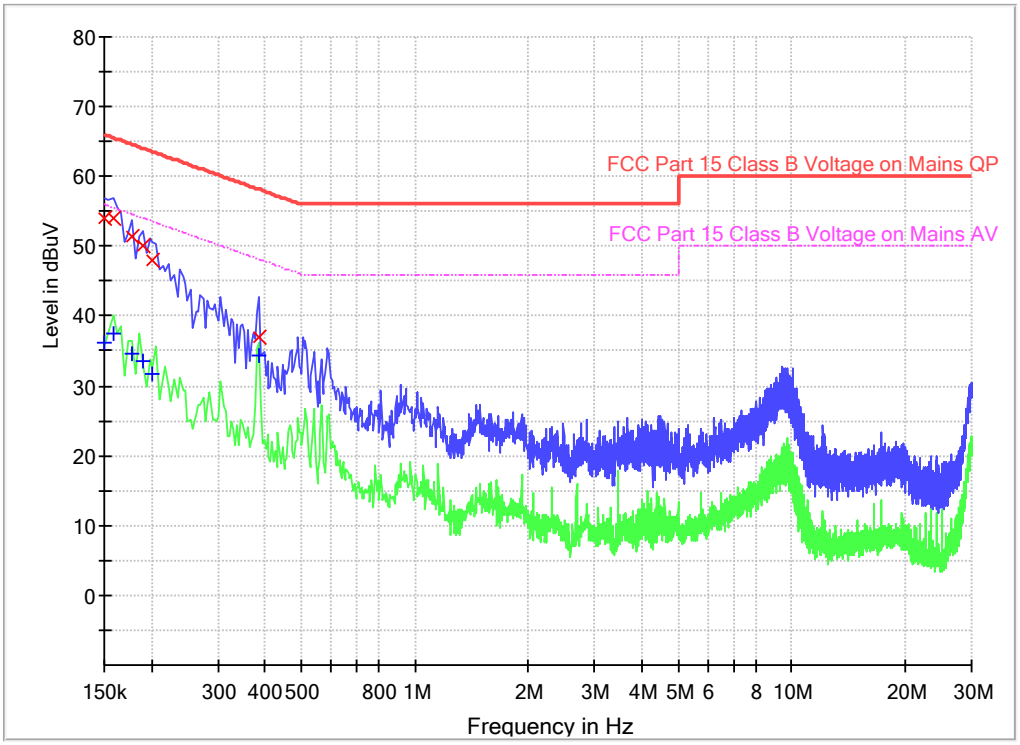
Vito Pan, Engineer
Typed/Printed Name

10 July 2024
Date

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 10 July 2024 Model: AX5100Q
Worst Case Operating Mode: Simultaneous Transmission
Modulation type: GFSK
Test Voltage: AC 120V/60Hz
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	54.0	9.000	L1	9.6	12.0	66.0
0.158000	54.0	9.000	L1	9.6	11.6	65.6
0.178000	51.4	9.000	L1	9.6	13.2	64.6
0.190000	50.0	9.000	L1	9.6	14.0	64.0
0.202000	48.1	9.000	L1	9.6	15.4	63.5
0.386000	37.0	9.000	L1	9.6	21.1	58.1

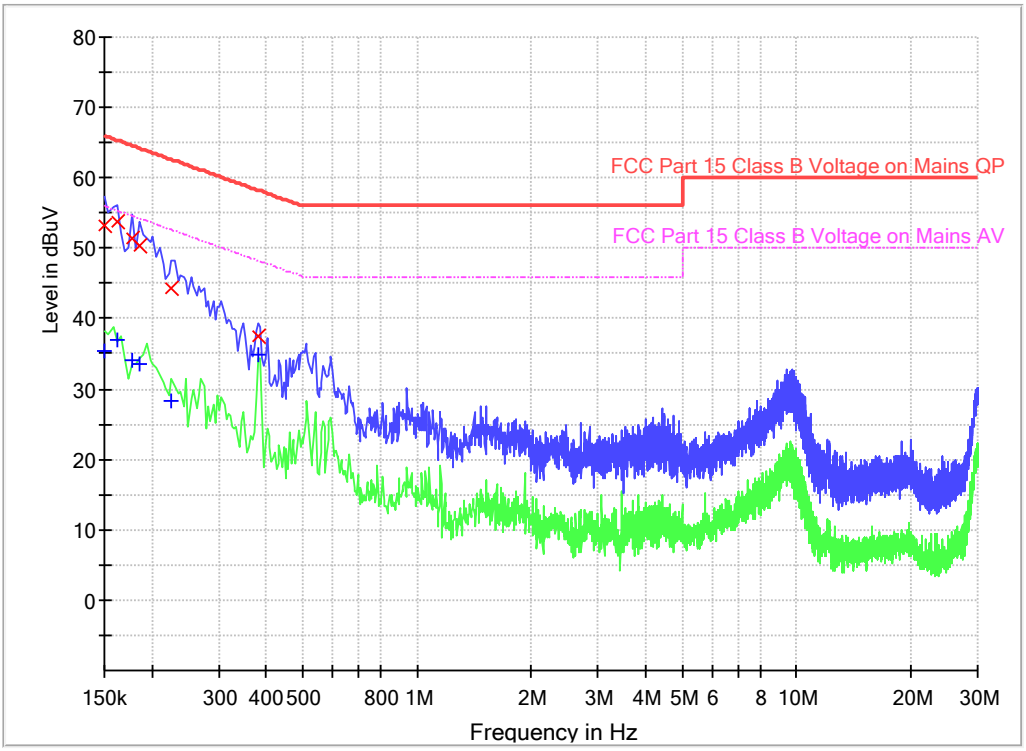
Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	36.2	9.000	L1	9.6	19.8	56.0
0.158000	37.5	9.000	L1	9.6	18.1	55.6
0.178000	34.6	9.000	L1	9.6	20.0	54.6
0.190000	33.6	9.000	L1	9.6	20.4	54.0
0.202000	31.6	9.000	L1	9.6	21.9	53.5
0.386000	34.2	9.000	L1	9.6	13.9	48.1

Applicant: Zhongshan City Richsound Electronic Industrial Ltd.
Date of Test: 10 July 2024 Model: AX5100Q
Worst Case Operating Mode: Simultaneous Transmission
Modulation type: GFSK
Test Voltage: AC 120V/60Hz
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	53.2	9.000	N	9.6	12.8	66.0
0.162000	53.7	9.000	N	9.6	11.7	65.4
0.178000	51.3	9.000	N	9.6	13.3	64.6
0.186000	50.4	9.000	N	9.6	13.8	64.2
0.226000	44.3	9.000	N	9.6	18.3	62.6
0.382000	37.5	9.000	N	9.6	20.7	58.2

Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	35.5	9.000	N	9.6	20.5	56.0
0.162000	36.9	9.000	N	9.6	18.5	55.4
0.178000	34.1	9.000	N	9.6	20.5	54.6
0.186000	33.6	9.000	N	9.6	20.6	54.2
0.226000	28.4	9.000	N	9.6	24.2	52.6
0.382000	34.8	9.000	N	9.6	13.4	48.2

5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

9.1 Band edge Plot

The test plots are attached as below. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Peak Measurement

Restricted-band band-edge tests shall be performed as radiated measurements, i.e (Band-edge Plot).

(i) Lower channel 5729.000 MHz:

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5725.000	69.0	36.7	28.1	60.4	74.0	-13.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5725.000	57.2	36.7	28.1	48.6	54.0	-5.4

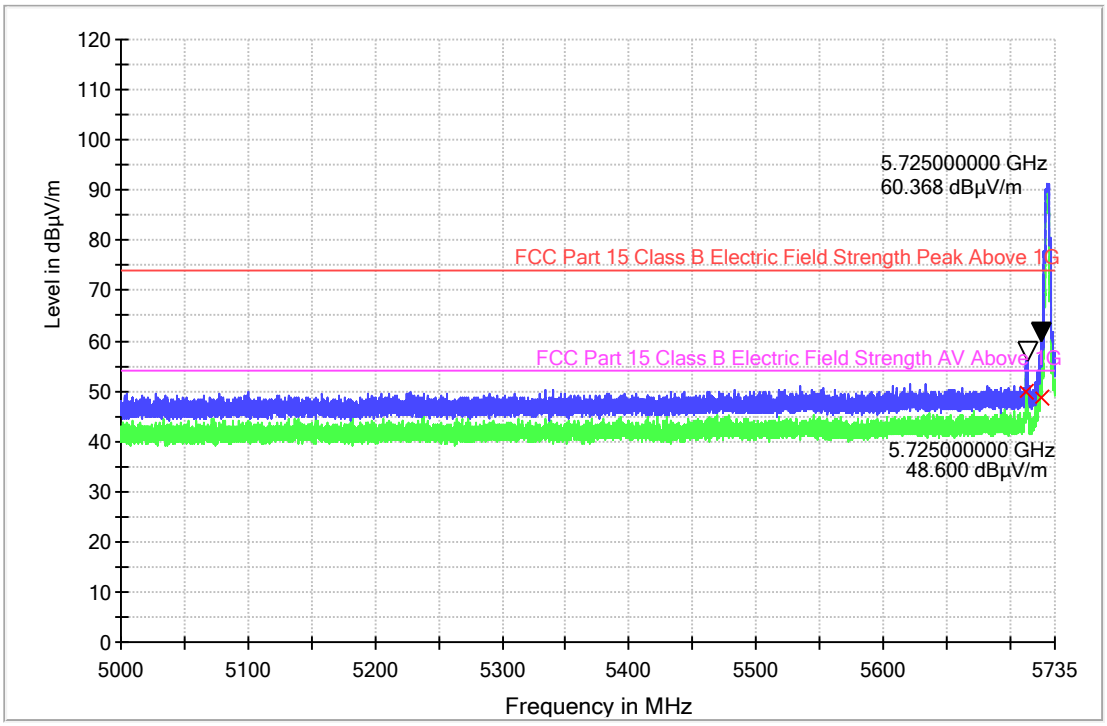
(ii) Upper channel 5849.000 MHz:

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	5875.000	60.9	36.8	29.1	53.2	74.0	-20.8

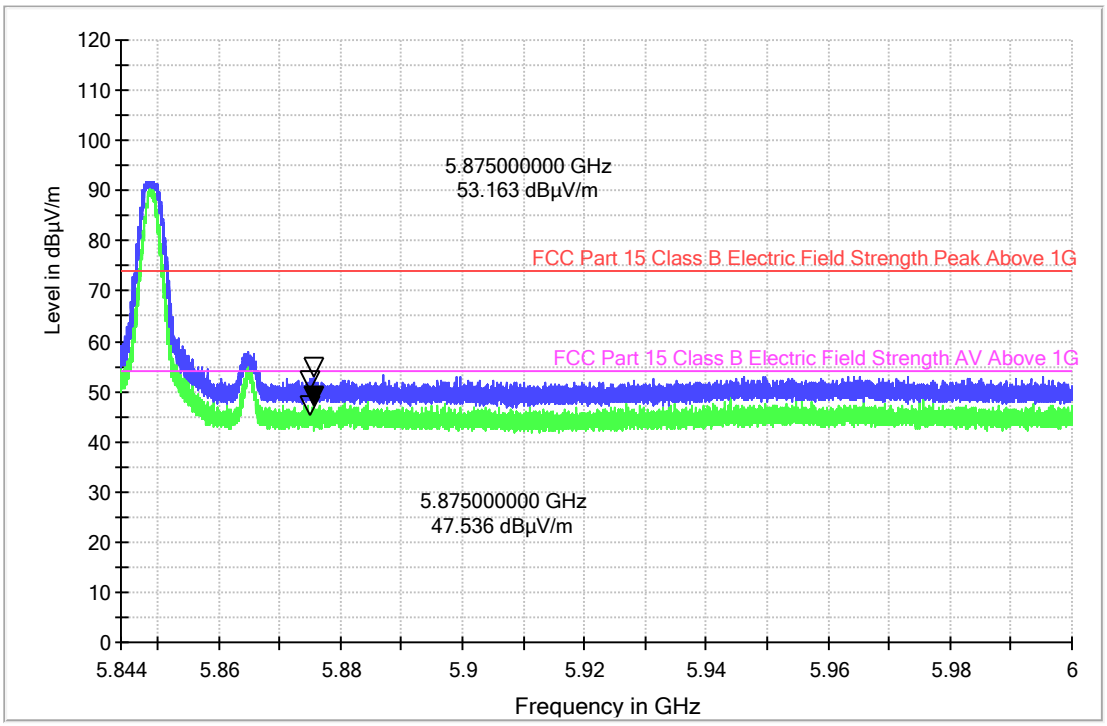
Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Horizontal	5875.000	55.2	36.8	29.1	47.5	54.0	-6.5

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74dBµv/m (Peak Limit) and 54dBµv/m (Average Limit).

Lowest frequency Channel

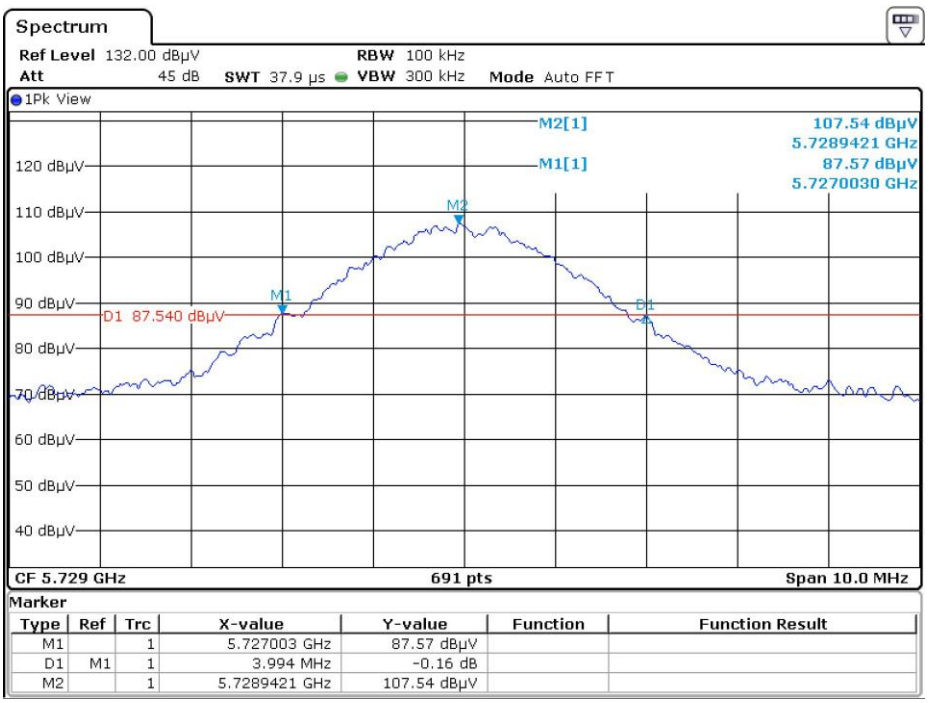


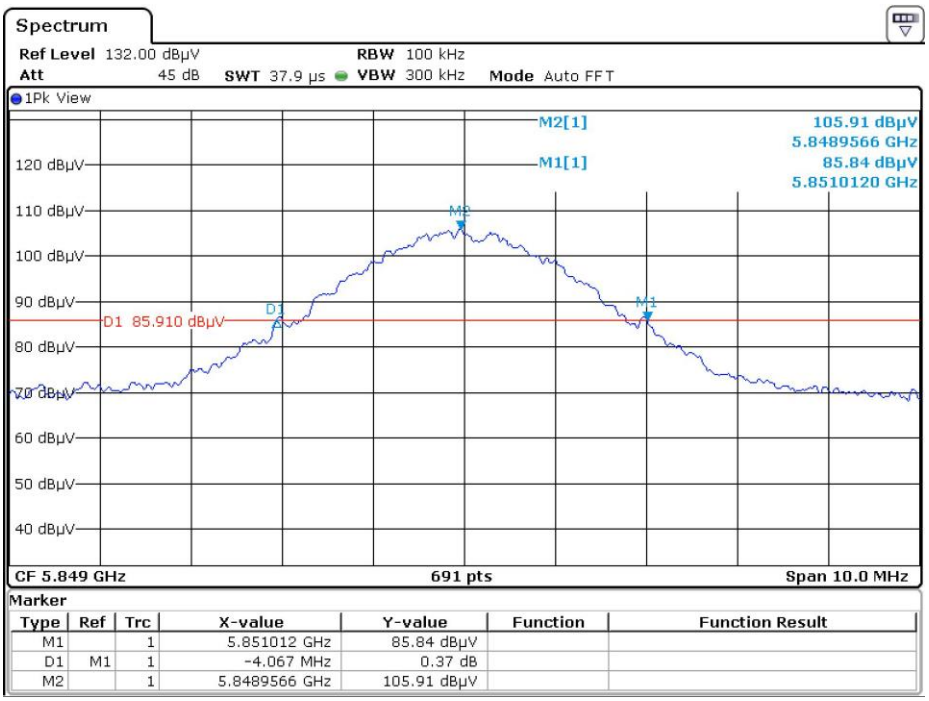
Highest frequency Channel



9.2 20dB Bandwidth

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.





9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

9.4 Transmitter Duty Cycle Calculation, FCC Rule 15.35(b, c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

9.5 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter up to 1GHz and 1.5 meter above 1GHz in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Section 9.4.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

9.5 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.10 - 2013.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Section 9.3). Above 1000 MHz, a resolution bandwidth of 1 MHz is used, RBW 5MHz used for fundamental emission.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-13	BiConiLog Antenna	ETS	3142E	00166158	2022-07-13	2025-07-13
SZ185-03	EMI Receiver	R&S	ESR7	101975	2024-04-23	2025-04-23
SZ061-09	Horn Antenna	ETS	3115	00092347	2022-07-13	2025-07-13
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2024-05-05	2027-05-05
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	2024-04-22	2025-04-22
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	2023-12-13	2024-12-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2024-04-22	2025-04-22
SZ188-05	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-05-25	2026-05-25
SZ062-02	RF Cable	RADIALL	RG 213U	--	2024-05-10	2024-11-10
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--Packet	2024-05-10	2024-11-10
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2024-05-10	2024-11-10
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2024-04-23	2025-04-23
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2024-07-09	2025-07-09
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	2023-10-18	2024-10-18
SZ188-03	Shielding Room	ETS	RFD-100	4100	2022-12-20	2025-12-20