TEST REPORT FOR CERTIFICATION
On Behalf of

TLV CO., LTD.

RFID module

Model No.: TLVRFID02

FCC ID: H3RTLVRFID02

Prepared for : TLV CO., LTD.
881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511 Japan

Prepared By : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park,
Nanshan District , Shenzhen, Guangdong, China

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Report Number	:	ACS-F23146
Date of Test	:	Jul.27~Aug.21,2023
Date of Report	:	Sep.13, 2023

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TEST REPORT CERTIFICATION

Applicant	:	TLV CO., LTD.
Manufacture	:	TLV CO., LTD.
EUT Description	:	RFID module
FCC ID	:	H3RTLVRFID02
		(A) Model No. : TLVRFID02
		(B) Test Voltage : DC 3.7V

Tested for comply with:
FCC CFR 47 Part 15 Subpart C

Test procedure used:
ANSI C63.10:2013

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements.

The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC and IC requirements.

This Report is made under FCC Part 2.1075. No modifications were required during testing to bring this product into compliance.

This report applies to single evaluation of one sample of above mentioned product. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

Date of Test : Jul.27~Aug.21,2023 Report of date: Sep.13, 2023

Prepared by : Jasmine Ning
Jasmine Ning / Assistant

Reviewer by : Thomas Chen
Thomas Chen / Assistant Manager

AUDIX 信華科技（深圳）有限公司 Audix Technology (Shenzhen) Co., Ltd. EMC 部門報告專用章 Stamp only for EMC Dept. Report

Approved & Authorized Signer : Signature:
Sunny Lu / Manager

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	**Standard**	**Results**
Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10: 2013	N/A
Radiated Emission Test	FCC Part 15: 15.205, 15.209 ANSI C63.10: 2013	PASS
20dB Bandwidth Test	FCC Part 15: 15.215	PASS
Note: N/A is mean Not Application		

2. GENERAL INFORMATION

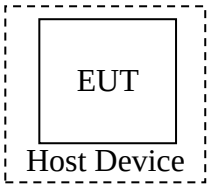
2.1. Description of Equipment Under Test

Applicant	TLV CO., LTD.
Applicant Address	881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511 Japan
Manufacturer	TLV CO., LTD.
Manufacturer Address	881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511 Japan
Product	RFID module
Model No.	TLVRFID02
Frequency Range	125kHz
Modulation	ASK
Host Device	Brand: TLV, Product name: RFID module, M/N: PT3
Sample Type	Prototype production
Date of Receipt	Jun.29,2023
Date of Test	Jul.27~Aug.21,2023

2.2. Tested Supporting System Details

[None]

2.3. Block diagram of connection between the EUT and simulators



Host Device: Product name: RFID module, M/N: PT3
(EUT: RFID module)

2.4. Test Facility

Site Description

Name of Firm : Audix Technology (Shenzhen) Co., Ltd.
No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China

EMC Lab. : Certificated by ISED, Canada
Company Number: 5183A
CAB identifier: CN0034
Valid Date: Mar.31, 2024

Certificated by FCC, USA
Designation No.: CN5022
Valid Date: Mar.31, 2024

Accredited by NVLAP, USA
NVLAP Code: 200372-0
Valid Date: Mar.31, 2024

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Radiation Emission test in 3m chamber	±3.8dB(30~200MHz, Polarization: H)
	±3.8dB(30~200MHz, Polarization: V)
	±4.0dB(200M~1GHz, Polarization: H)
	±4.0dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation spurious emission at frequency below 30MHz	±2.6dB(9kHz~30MHz)
Uncertainty for Radiation Emission test in 3m chamber(1GHz-25GHz)	±4.0dB(1~6GHz, Distance: 3m)
	±4.0dB(6~25GHz, Distance: 3m)
Uncertainty for DC power test	±0.1%
Uncertainty for test site temperature and humidity	±0.6℃
	±3%

3. POWER LINE CONDUCTED EMISSION TEST

According to Paragraph (c) of FCC Part 15 section 15.207, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Host device is battery powered and does not operate when host device is connected to AC lines.

4. RADIATED EMISSION TEST

4.1. Test Equipment

Frequency Range: 30-1000MHz

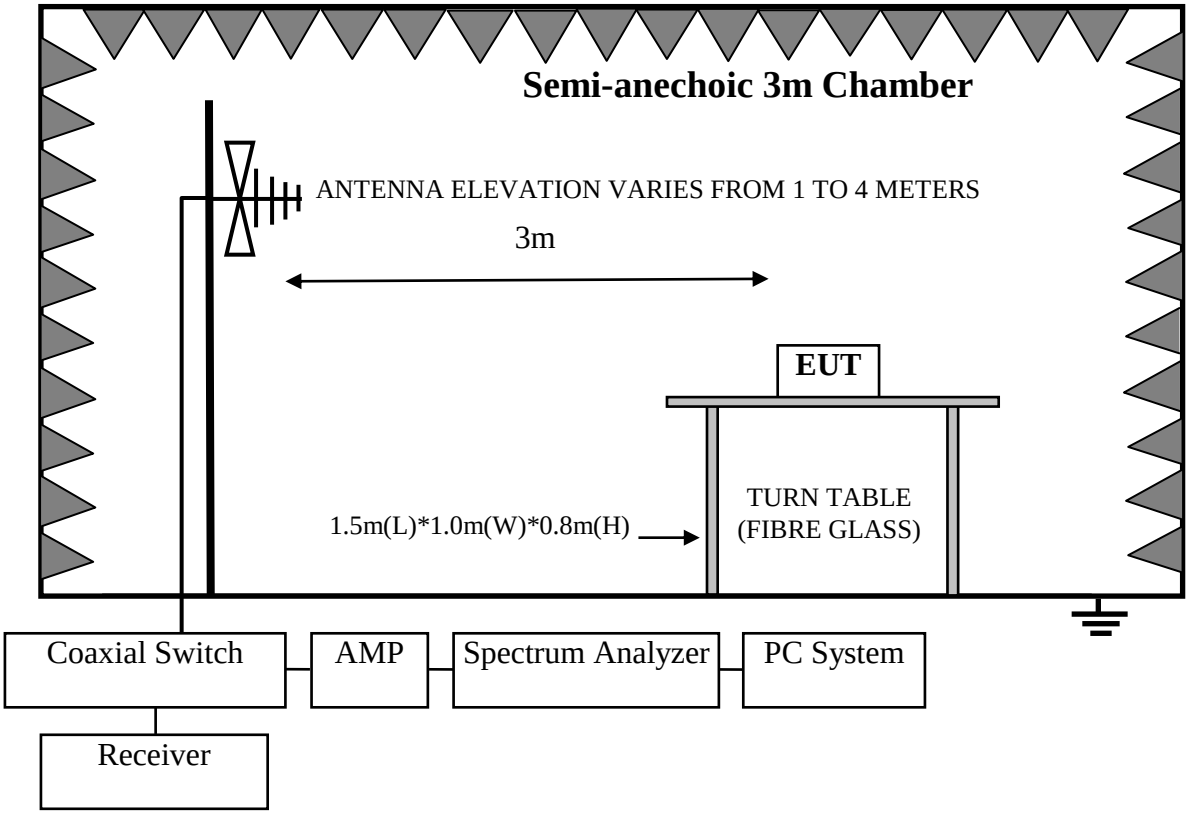
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3m Chamber(NSA)	AUDIX	N/A	N/A	Aug.11,22	5 Year
2.	3m Chamber(SE)	AUDIX	N/A	N/A	Sep.16,22	5 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	103670	Jun.25,23	1 Year
4.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	01317	Oct.28,22	1 Year
5.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3	Oct.09,22	1 Year
6.	Coaxial Switch	Anritsu	MP59B	6201397223	Apr.02,23	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESR3	101931	Apr.01,23	1 Year
8.	Amplifier	HP	8447D	2944A11159	Apr.02,23	1 Year
9.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
10.	Tri-log-Broadband Antenna	SCHWARZBECK	VULB 9168	493	Jan.09,23	1 Year
Note: N/A means Not applicable.						

Frequency Range: Below 30MHz

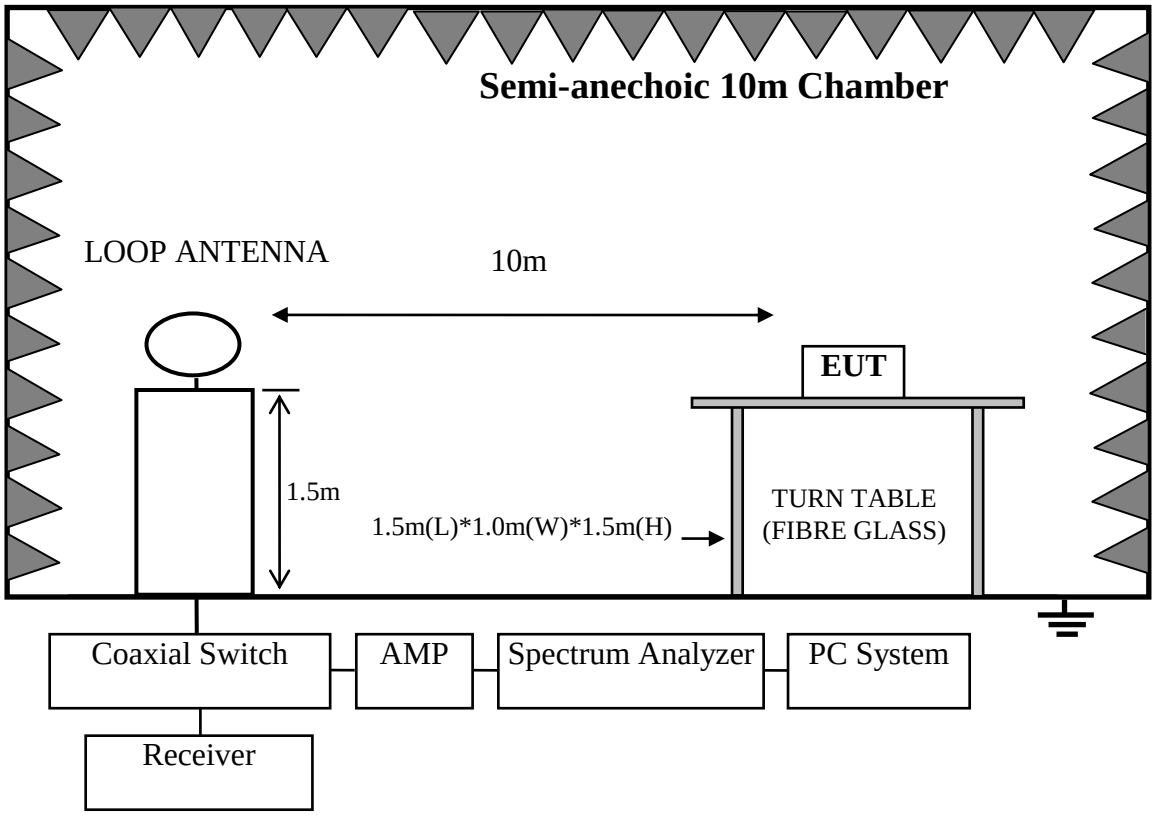
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	10m Chamber(NSA)	AUDIX	N/A	N/A	Aug.12,22	5 Year
2.	10m Chamber(SE)	AUDIX	N/A	N/A	Sep.16,22	5 Year
3.	Active Receive Loop Antenna	SCHWARZBECK	FMZB 1513-60B	00035	Apr.19,23	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR3	102891	Oct.10,22	1 Year
5.	RF Cable	SPUMA	CFD400NL-LW	NO.4	Apr.02,23	1 Year
6.	Amplifier	EMCI	EMC9135	980348	Feb.23,23	1 Year
7.	Signal Analyzer	Rohde & Schwarz	FSV30	103669	Oct.09,22	1 Year
8.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
Note: N/A means Not applicable.						

4.2. Block Diagram of Test Setup

Frequency Range: 30-1000MHz



Frequency Range: Below 30MHz



4.3. Radiated Emission Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark**:** (1) Emission level = Antenna Factor + Cable Loss + Reading
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Radiated emission Limit(Below 30MHz)

Frequency (MHz)	Field strength (microvolts/meter)	Measurement Distance(meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/f(KHz)	30
1.705-30.0	30	30

Remark: (1) Emission level dBμV = 20 log Emission level μV/m
(2) In the emission table above, the tighter limit applies at the band edges.
(3) The limit 1.705MHz to 30MHz in clause 4.3 are specified at 30 meters, and measurements were made at 10 meters, the limit is translated to 10 meters by using a formula as follows:$Limit_{10m} = Limit_{30m} + 40\log(30m/10m)$ or $Limit_{10m} = Limit_{300m} + 40\log(300m/10m)$

4.4. 15.205 Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.5. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.6. Operating Condition of EUT

4.6.1.Setup the EUT as shown in Section 4.2.

4.6.2.Turn on the power of all equipments.

4.6.3.Let the EUT worked in test mode (Tx Mode) and tested it.

4.7. Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

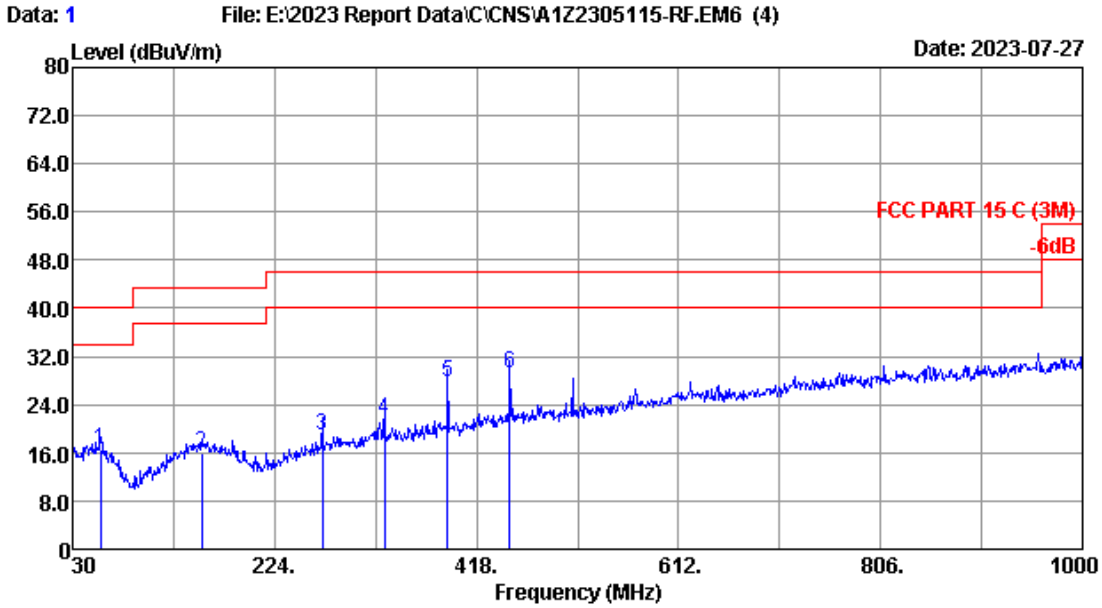
For emissions below 30MHz:
This test was performed on anechoic chamber with a conductive ground plane, EUT was put to 1.5m high turn table and at a distance of 10m from test antenna.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

4.8. Radiated Emission Test Results

PASS.

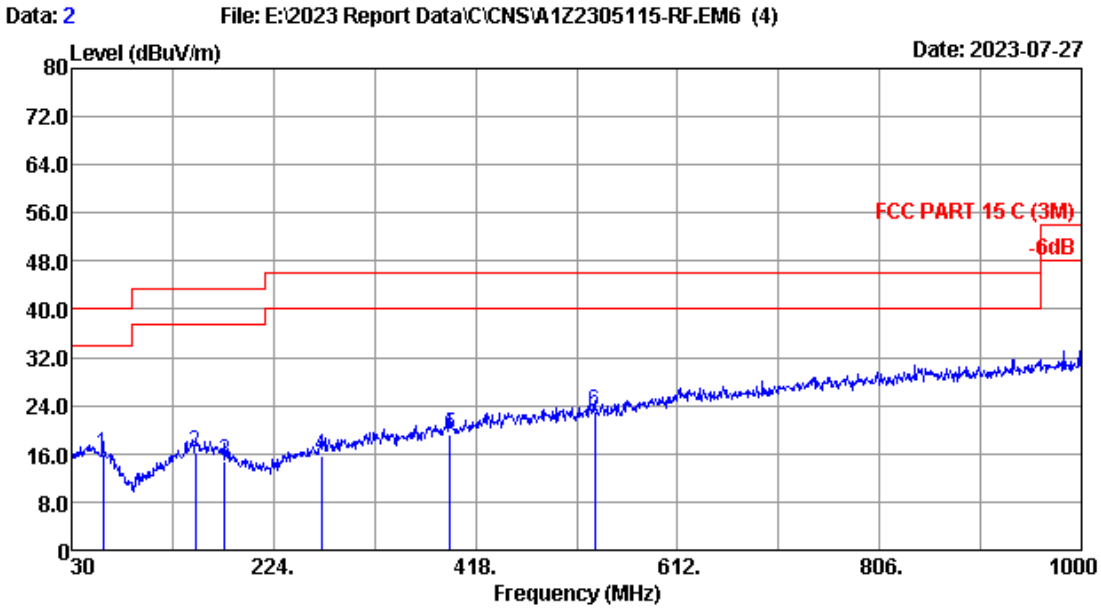
Frequency Range: 30-1000MHz



Site no. : 3m Chamber
Data no. : 1
Dis. / Ant. : 3m 2022 VULB 9168-01317
Ant. pol. : HORIZONTAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 22.2*C/56%
Engineer : Abel
Test Mode : TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	57.160	19.40	0.76	-3.62	16.54	40.00	23.46	QP
2	154.160	19.50	1.24	-4.82	15.92	43.50	27.58	QP
3	269.590	18.50	1.67	-1.42	18.75	46.00	27.25	QP
4	329.730	20.20	1.87	-0.42	21.65	46.00	24.35	QP
5	389.870	21.40	2.03	4.44	27.87	46.00	18.13	QP
6	450.010	23.10	2.22	3.99	29.31	46.00	16.69	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

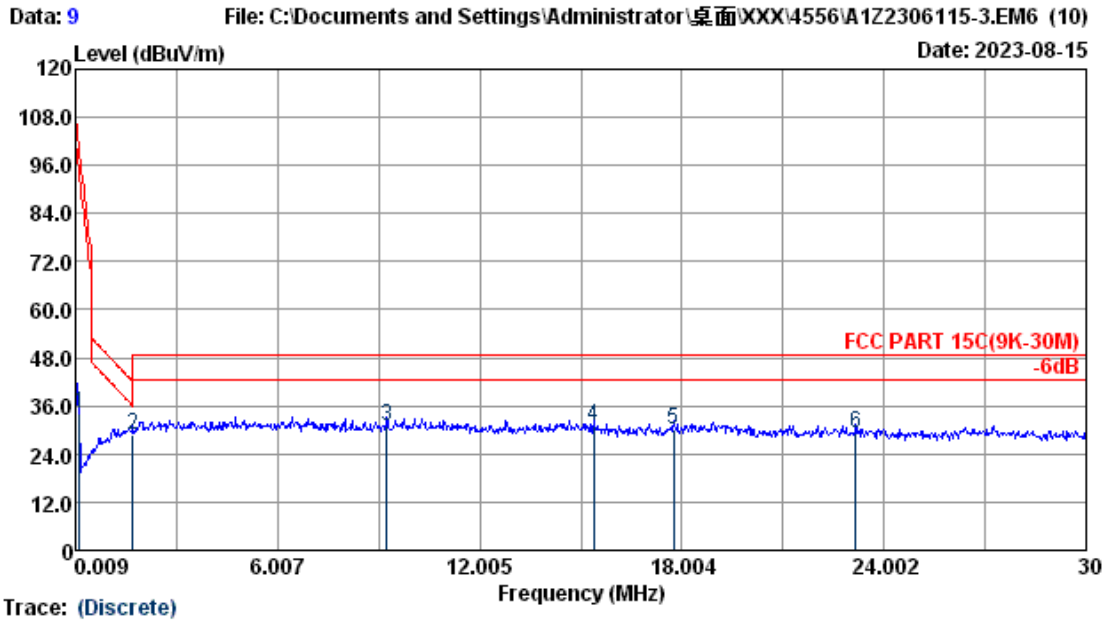


Site no. : 3m Chamber Data no. : 2
Dis. / Ant. : 3m 2022 VULB 9168-01317 Ant. pol. : VERTICAL
Limit : FCC PART 15 C (3M)
Env. / Ins. : 22.2*C/56% Engineer : Abel
Test Mode : TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	60.070	19.10	0.78	-3.88	16.00	40.00	24.00	QP
2	149.310	19.40	1.23	-4.40	16.23	43.50	27.27	QP
3	177.440	18.00	1.33	-4.62	14.71	43.50	28.79	QP
4	269.590	18.50	1.67	-4.48	15.69	46.00	30.31	QP
5	393.750	21.40	2.04	-4.13	19.31	46.00	26.69	QP
6	532.460	24.00	2.47	-3.59	22.88	46.00	23.12	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Frequency Range: Below 30MHz

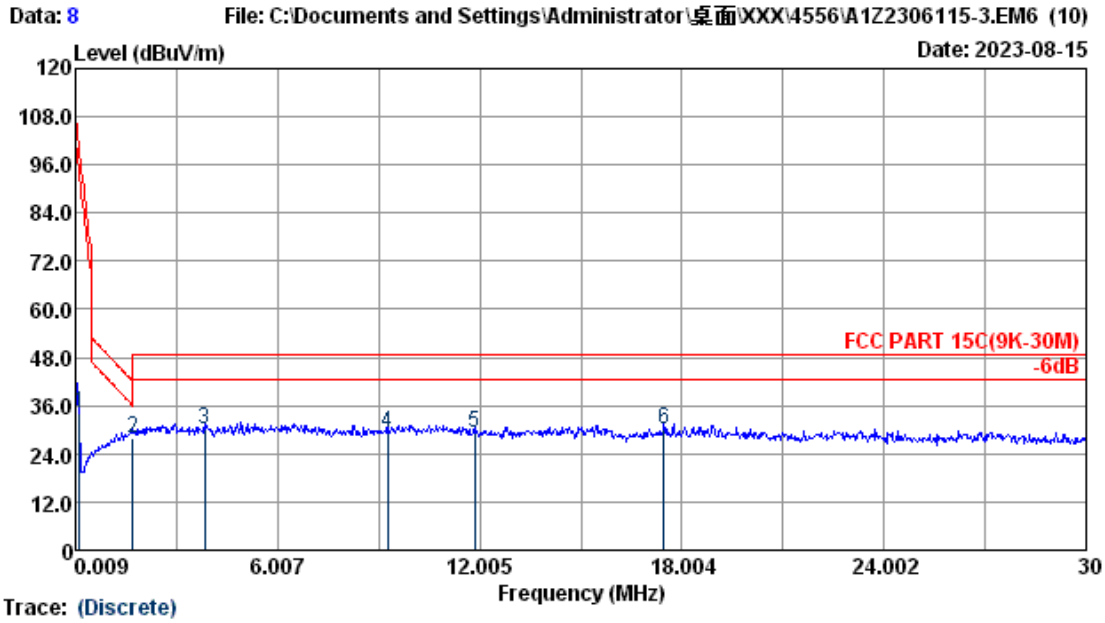


Trace: (Discrete)

Site no. : 10m Chamber Data no. : 9
Dis. / Ant. : 10m 2023 FMZB1513-60-10 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C(9K-30M)
Env. / Ins. : 23.4*C/52% Engineer : Hongjie
Test Mode : TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	0.125	20.18	0.04	13.99	34.21	99.23	65.02	QP
2	1.718	19.98	0.19	8.76	28.93	48.63	19.70	QP
3	9.246	19.78	0.47	10.95	31.20	48.63	17.43	QP
4	15.394	19.68	0.57	10.65	30.90	48.63	17.73	QP
5	17.764	19.69	0.60	9.83	30.12	48.63	18.51	QP
6	23.162	19.74	0.66	8.95	29.35	48.63	19.28	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Trace: (Discrete)

Site no. : 10m Chamber Data no. : 8
Dis. / Ant. : 10m 2023 FMZB1513-60-10 Ant. pol. : VERTICAL
Limit : FCC PART 15C(9K-30M)
Env. / Ins. : 23.4*C/52% Engineer : Hongjie
Test Mode : TX Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	0.125	20.18	0.02	13.75	33.95	99.23	65.28	QP
2	1.718	19.98	0.19	7.84	28.01	48.63	20.62	QP
3	3.848	19.90	0.26	9.94	30.10	48.63	18.53	QP
4	9.276	19.78	0.47	9.16	29.41	48.63	19.22	QP
5	11.855	19.74	0.53	8.87	29.14	48.63	19.49	QP
6	17.464	19.68	0.59	9.63	29.90	48.63	18.73	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

5. 20 DB BANDWIDTH TEST

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.01,23	1 Year
2.	RF Cable	eastsheep	141-SMA-JJ-1000	NO.1	Jun.25,23	1Year

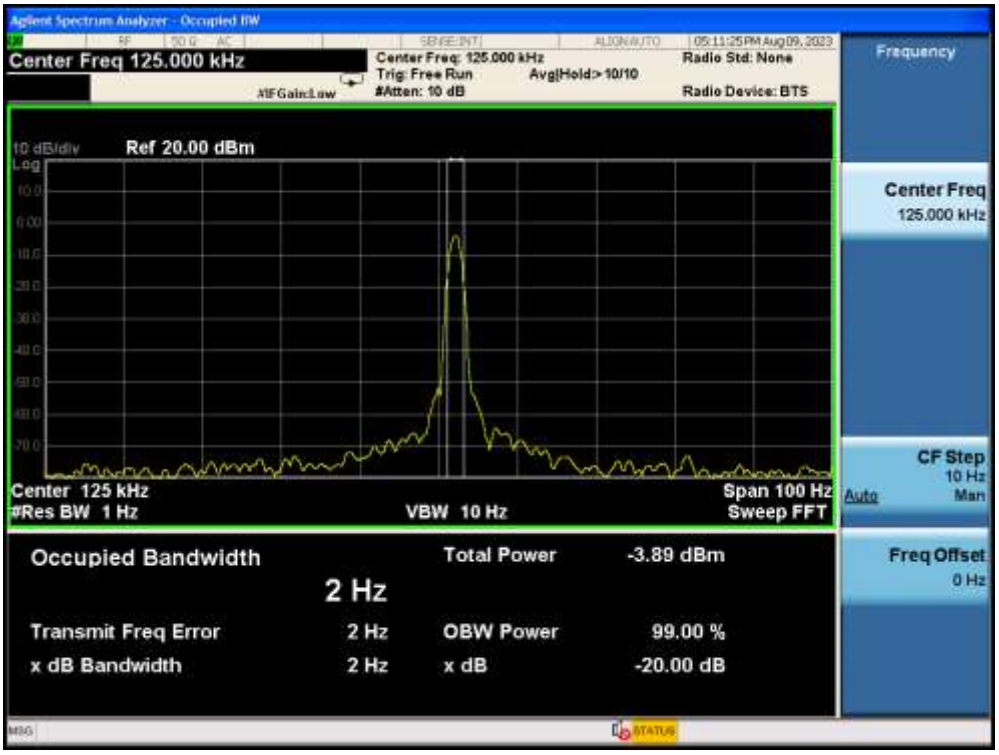
5.2. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.3. Test Results

EUT: RFID module		
M/N: TLVRFID02		
Test date: 2023-08-09	Pressure: 102.1±1.0 kpa	Humidity: 53.2±3.0%
Tested by: lili	Test site: RF site	Temperature: 22.3±0.6℃

Frequency（kHz)	20bandwidth（Hz）	Limit (kHz)
125	2	N/A
Conclusion:Pass		



6. DEVIATION TO TEST SPECIFICATIONS

[NONE]