



TEST REPORT

Reference No...... : WTA24F08192418W
FCC ID : 2AJJGHJRF
Applicant..... : Qingdao Richmat Intelligence Technology Inc
Address..... : NO.78 Kongquehe 4th Road, Qingdao Clothing Industry park, Jimo, Qingdao, Shandong Province, China.
Manufacturer : The same as above
Address..... : The same as above
Product Name..... : Module
Model No...... : HJ RF
Test specification..... : FCC CFR47 Part 15 Subpart C (Section 15.249)
Date of Receipt sample : 2024-10-11
Date of Test : 2024-10-16
Date of Issue..... : 2024-10-21
Test Report Form No. : WEW-15247A-01B
Test Result..... **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

Waltek Testing Group (Foshan) Co., Ltd.

Address: 1/F., Building 19, Sunlink Machinery City, Xingye 4 Road,
Guanglong Industrial Park, Chihua Neighborhood Committee, Chencun Town,
Shunde District, Foshan, Guangdong, China

Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Tested by:

Roy Hong

Approved by:

Danny Zhou



1 Revision History

Test Report No.	Date of Issue	Description	Status
WTA24F08192418W	2024-10-21	Class II Permissive Change	Valid

WALTEK



2 Contents

	Page
1 REVISION HISTORY	2
2 CONTENTS	3
3 GENERAL INFORMATION.....	4
3.1 GENERAL DESCRIPTION OF E.U.T	4
3.2 TECHNICAL CHARACTERISTICS OF EUT.....	4
3.3 STANDARDS APPLICABLE FOR TESTING	4
3.4 TEST FACILITY.....	5
3.5 SUBCONTRACTED.....	5
3.6 ABNORMALITIES FROM STANDARD CONDITIONS	5
3.7 DISCLAIMER.....	5
4 EUT SETUP AND TEST MODE.....	6
5 EQUIPMENT USED DURING TEST	7
5.1 EQUIPMENT LIST	7
5.2 TEST SOFTWARE.....	8
5.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	8
5.4 MEASUREMENT UNCERTAINTY	8
6 SUMMARY OF TEST RESULT.....	9
6.1 RADIATED SPURIOUS EMISSIONS	10
6.1.1 <i>Standard Applicable</i>	10
6.1.2 <i>Test Procedure</i>	10
6.1.3 <i>Corrected Amplitude & Margin Calculation</i>	12
6.1.4 <i>Test Results</i>	13
7 PHOTOGRAPHS TEST SETUP.....	27
7.1 PHOTOGRAPHS - RADIATED EMISSION TEST SETUP	27
8 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	28
8.1 EUT - EXTERNAL PHOTOS.....	28
8.2 EUT – INTERNAL PHOTOS	37



3 General Information

3.1 General Description of E.U.T

Product Name : Module

Model No. : HJ RF

Remark : The report is C2PC report, the following host models were added and tested.

Host Models : HJSR96, HJSR96B, HJSR96C

Host Models Difference : HJSR96B and HJSR96C are identical except for the appearance. HJSR96 is different from other models. Therefore the necessary test was performed on model HJSR96B and HJSR96.

Rating : Battery 4.5V (3*1.5V AAA)

Battery Capacity : ---

Power Adapter : ---

3.2 Technical Characteristics of EUT

Frequency Range : 2405-2480 MHz

Modulation : FSK

Quantity of Channels : 151

Channel Separation : 0.5MHz

Type of Antenna : PCB Antenna

Antenna Gain : 0dBi

3.3 Standards Applicable for Testing

The tests were performed according to following standards:

FCC Rules Part 15.249	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices



3.4 Test Facility

The test facility has a test site registered with the following organizations:

ISED – Registration No.: 21895

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science and Economic Development Canada (ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number: 21895, March 12, 2019

FCC – Registration No.: 820106

Waltek Testing Group (Foshan) 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 820106, August 16, 2018

FCC – Designation No.: CN5034

Waltek Testing Group (Foshan) 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. Designation No. CN5034.

NVLAP – Lab Code: 600191-0

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

3.6 Abnormalities from Standard Conditions

None.

3.7 Disclaimer

The antenna gain information is provided by the customer. The laboratory is not responsible for the accuracy of the antenna gain information.



4 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List

Test Mode	Description	Remark
TM1	Lowest Channel	2405MHz
TM2	Middle Channel	2440MHz
TM3	Highest Channel	2480MHz

Test Conditions

Temperature:	22~25℃
Relative Humidity:	50~55%
Atmospheric pressure:	101.9kPa

WALTEK



5 Equipment Used during Test

5.1 Equipment List

☐ Conducted Emissions 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102423	2024-01-05	2025-01-04
2.	LISN	R&S	ENV216	101343	2024-01-05	2025-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	2024-01-04	2025-01-03
4.	Switch	CD	RSU-A4 18G	RSUA4008	2024-01-04	2025-01-03
☐ Conducted Emissions 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESCI	101178	2024-01-06	2025-01-05
2.	LISN	R&S	ENV216	101215	2024-01-05	2025-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	6102701	2024-01-04	2025-01-03
4.	Switch	ESE	RSU/M2	---	2024-01-04	2025-01-03
☐ Conducted Emissions 3#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102842	2024-01-05	2025-01-04
2.	LISN	R&S	ENV216	101542	2024-01-05	2025-01-04
3.	Cable	YIHENG	LMR195UF-NMNM-2.5	---	2024-01-04	2025-01-03
4.	Manual RF Switch	YIHENG	SW-2	RSU0402	2024-01-04	2025-01-03
☒ Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2024-01-05	2025-01-04
2.	EMI Test Receiver	RS	ESR7	101566	2024-01-06	2025-01-05
3.	EMC Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
4.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	2024-01-05	2025-01-04
5.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	2024-01-05	2025-01-04
6.	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2024-01-06	2025-01-05
7.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2024-01-05	2025-01-04
8.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	01119	2024-01-05	2025-01-04
9.	Coaxial Cable (above 1GHz)	Times-Microwave	CBL5-NN	-	2024-01-04	2025-01-03
10.	Amplifier	Lunar E M	LNA1G18-40	20160501002	2024-01-04	2025-01-03



☒ RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
2.	Analog Signal Generator	Agilent	N5181A	MY48180720	2024-01-04	2025-01-03
3.	RF Control Unit	CHANGCHUANG	JS0806-2	-	2024-01-04	2025-01-03

☐: Not Used

☒: Used

5.2 Test Software

Description	Manufacturer	Model	Version
EMI Test Software (Conducted Emission 1#)	FARATRONIC	EZ-EMC	EMEC-3A1
EMI Test Software (Conducted Emission 2#)	FARATRONIC	EZ-EMC	FARAD-3A1.1+
EMI Test Software (Conducted Emission 3#)	FARATRONIC	EZ-EMC	EMC-CON 3A1.1+
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-2
RF Conducted Test Software	Chinese EMC	EMS	V1.0.0.0

5.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.
1.	/	/	/	/

5.4 Measurement Uncertainty

Parameter	Uncertainty
RF Output Power	±2.2dB
Occupied Bandwidth	±1.5%
Conducted Emission	±2.6dB
Transmitter Spurious Emission	±3.8dB (for 25MHz-1GHz)
	±5.0dB (for 1GHz-18GHz)

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



6 Summary of Test Result

Test Items	FCC Rules	Result
Radiated Spurious Emissions	§15.209(a)	Compliant

Remark:

- Pass Test item meets the requirement
- Fail Test item does not meet the requirement
- N/A Test case does not apply to the test object

WALTEK



6.1 Radiated Spurious Emissions

6.1.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

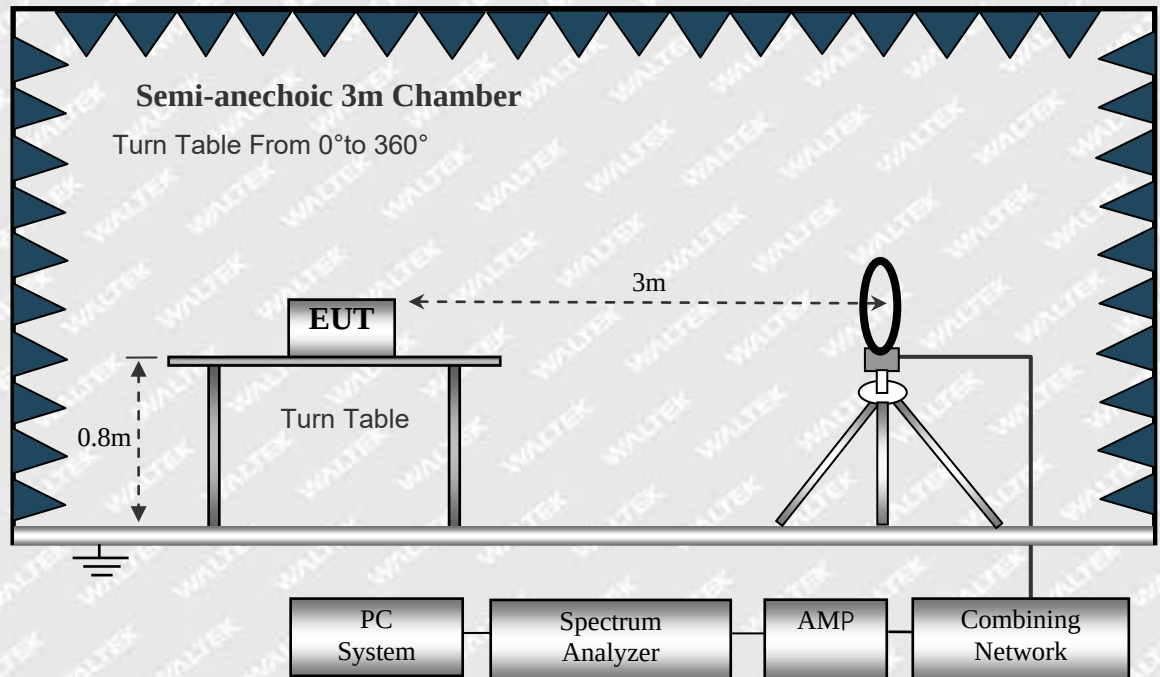
6.1.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

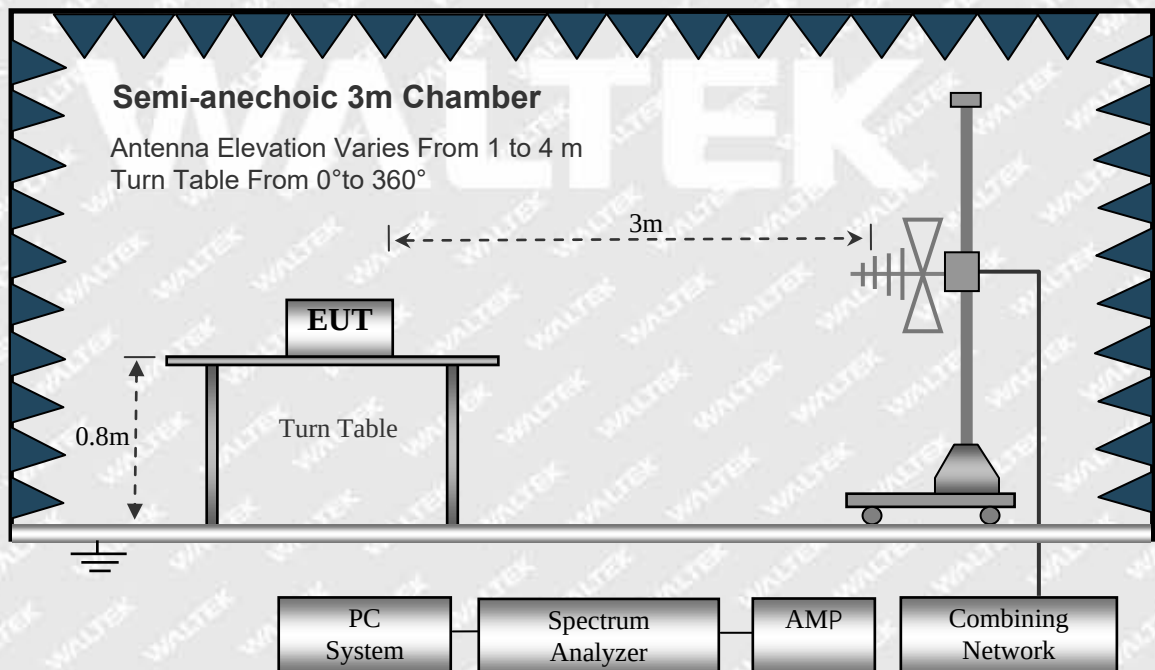
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.



The test setup for emission measurement below 30MHz.

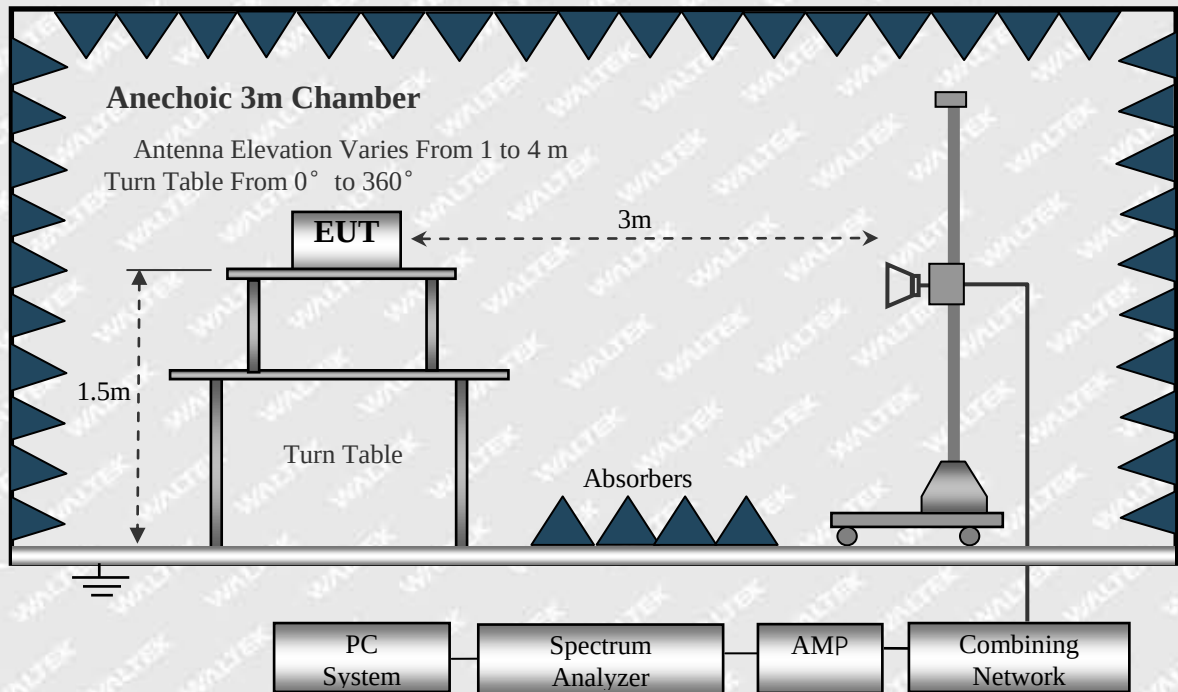


The test setup for emission measurement from 30 MHz to 1 GHz.





The test setup for emission measurement above 1 GHz.



9KHz-30MHz

RBW=10kHz
VBW=30kHz
Sweep time=Auto
Trace=Max hold
Detector function=peak

30MHz-1GHz

RBW=120kHz
VBW=300kHz
Sweep time=Auto
Trace=Max hold
Detector function=peak, QP

Above 1GHz

RBW=1MHz
VBW=3MHz(Peak), 10MHz(AV)
Sweep time=Auto
Trace=Max hold
Detector function=peak, AV

6.1.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$



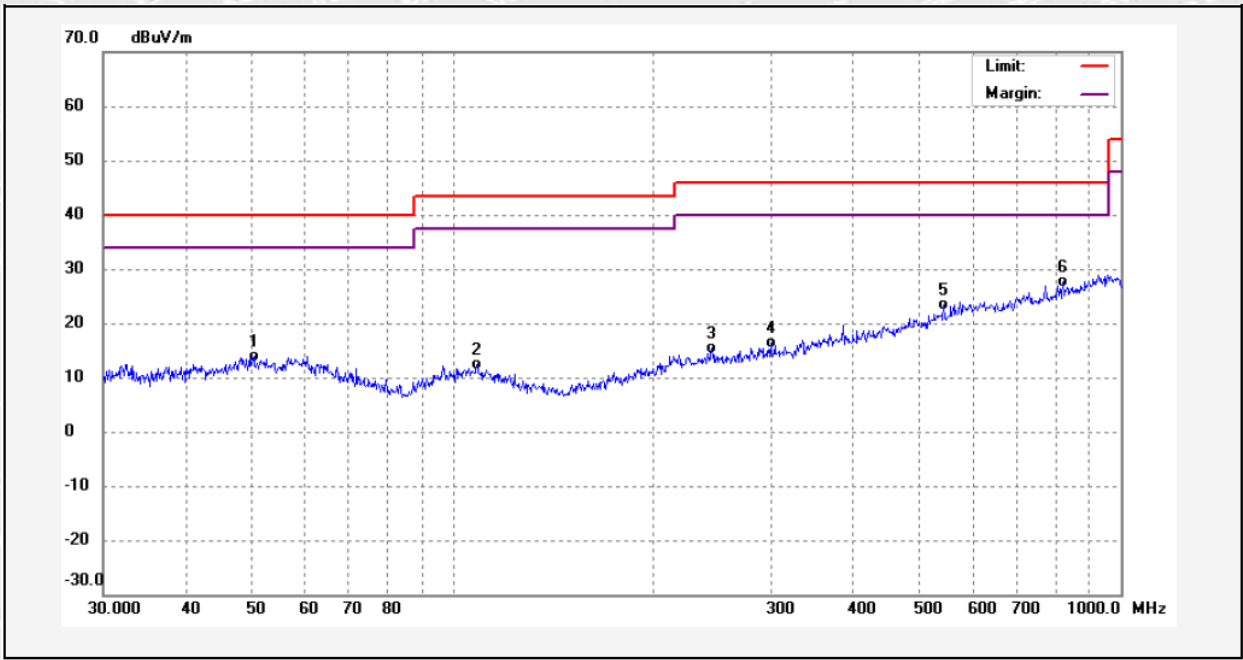
6.1.4 Test Results

Test Model: HJSR96

Test Frequency: Below 1GHz

Test Channel: Lowest Channel

Polarization: Vertical

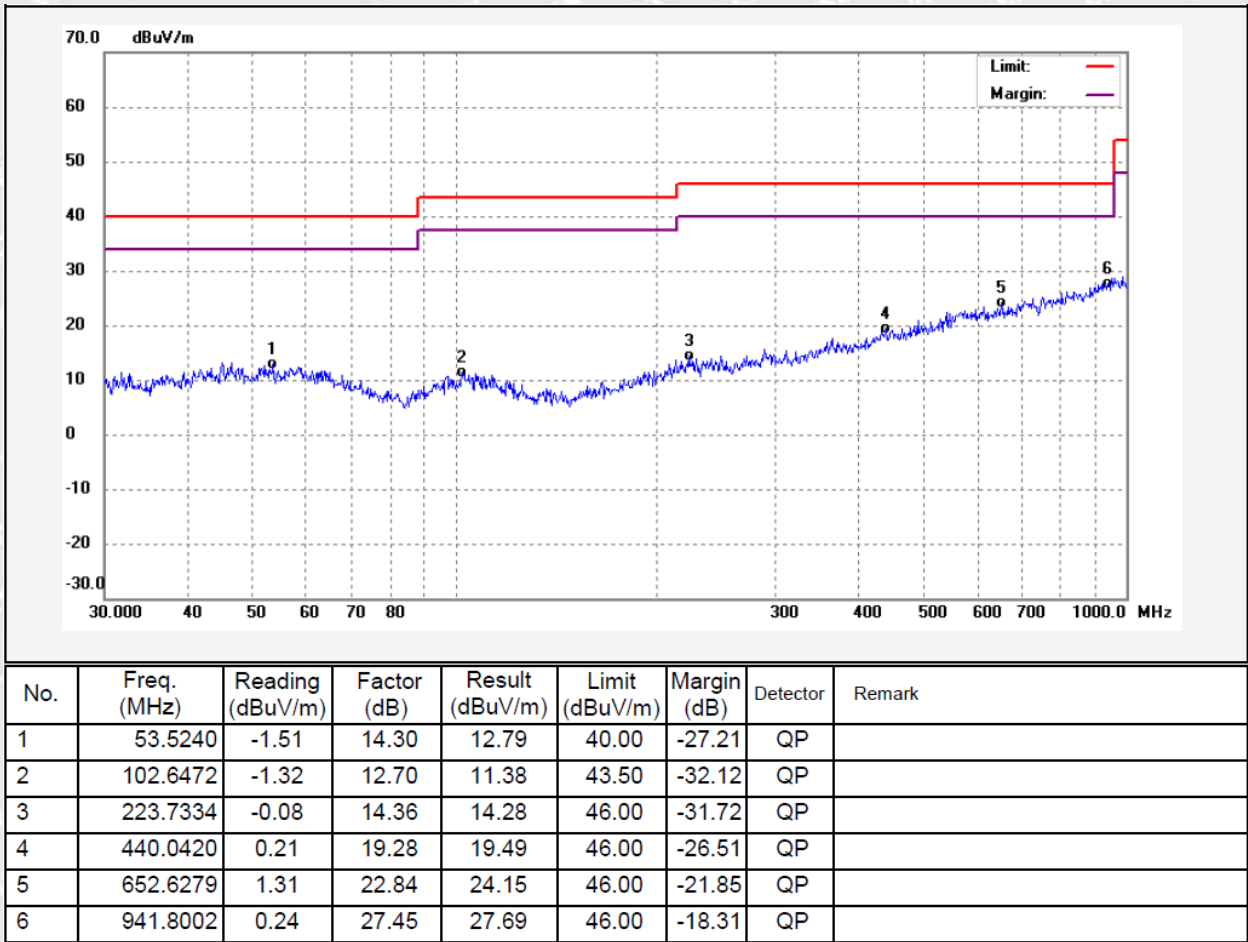


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	50.4442	-0.43	14.26	13.83	40.00	-26.17	QP	
2	108.6851	-0.42	12.83	12.41	43.50	-31.09	QP	
3	244.9181	0.79	14.48	15.27	46.00	-30.73	QP	
4	299.6308	0.59	15.78	16.37	46.00	-29.63	QP	
5	544.0367	2.04	21.29	23.33	46.00	-22.67	QP	
6	821.7103	1.39	26.15	27.54	46.00	-18.46	QP	



Test Model: HJSR96
Test Channel: Lowest Channel

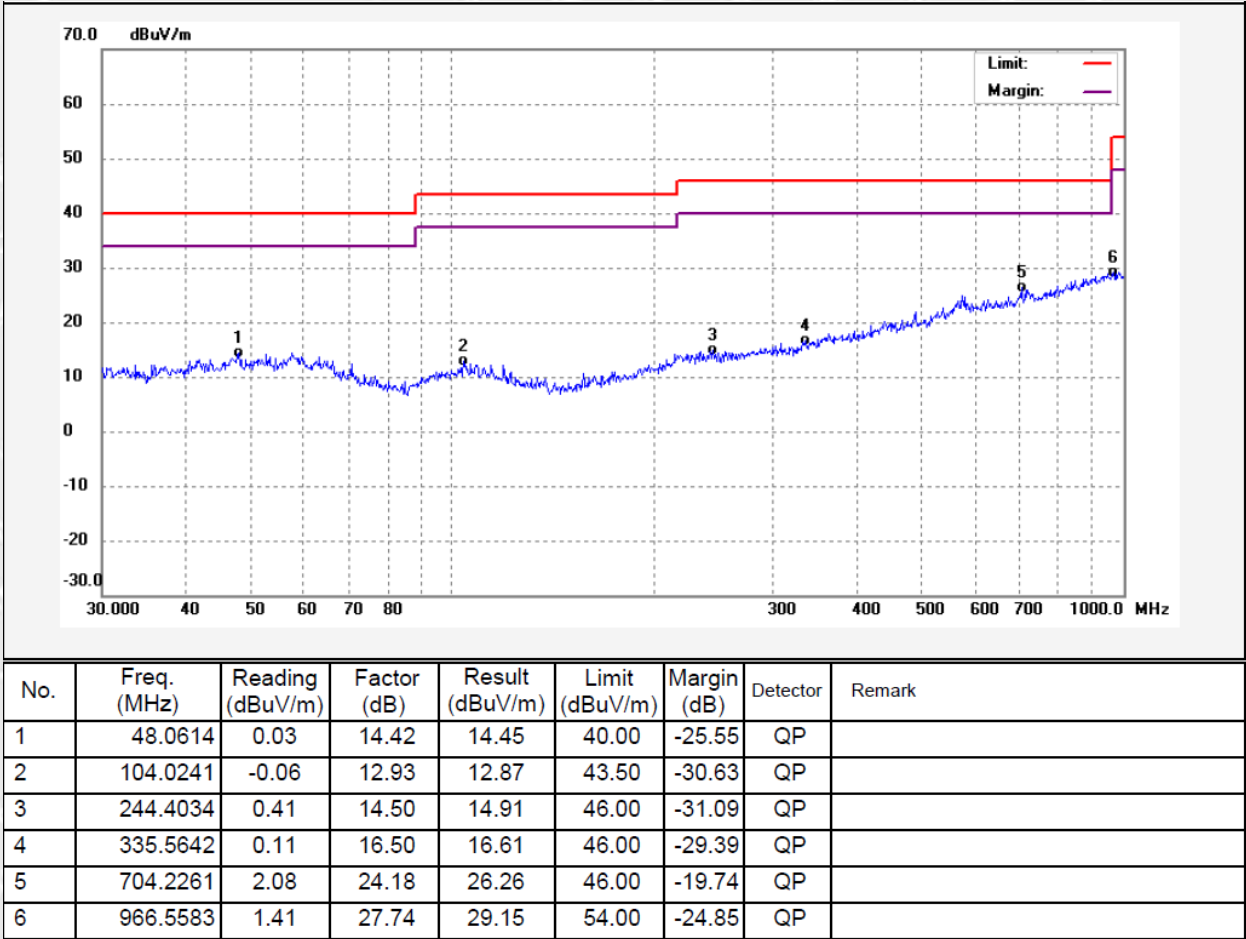
Test Frequency: Below 1GHz
Polarization: Horizontal

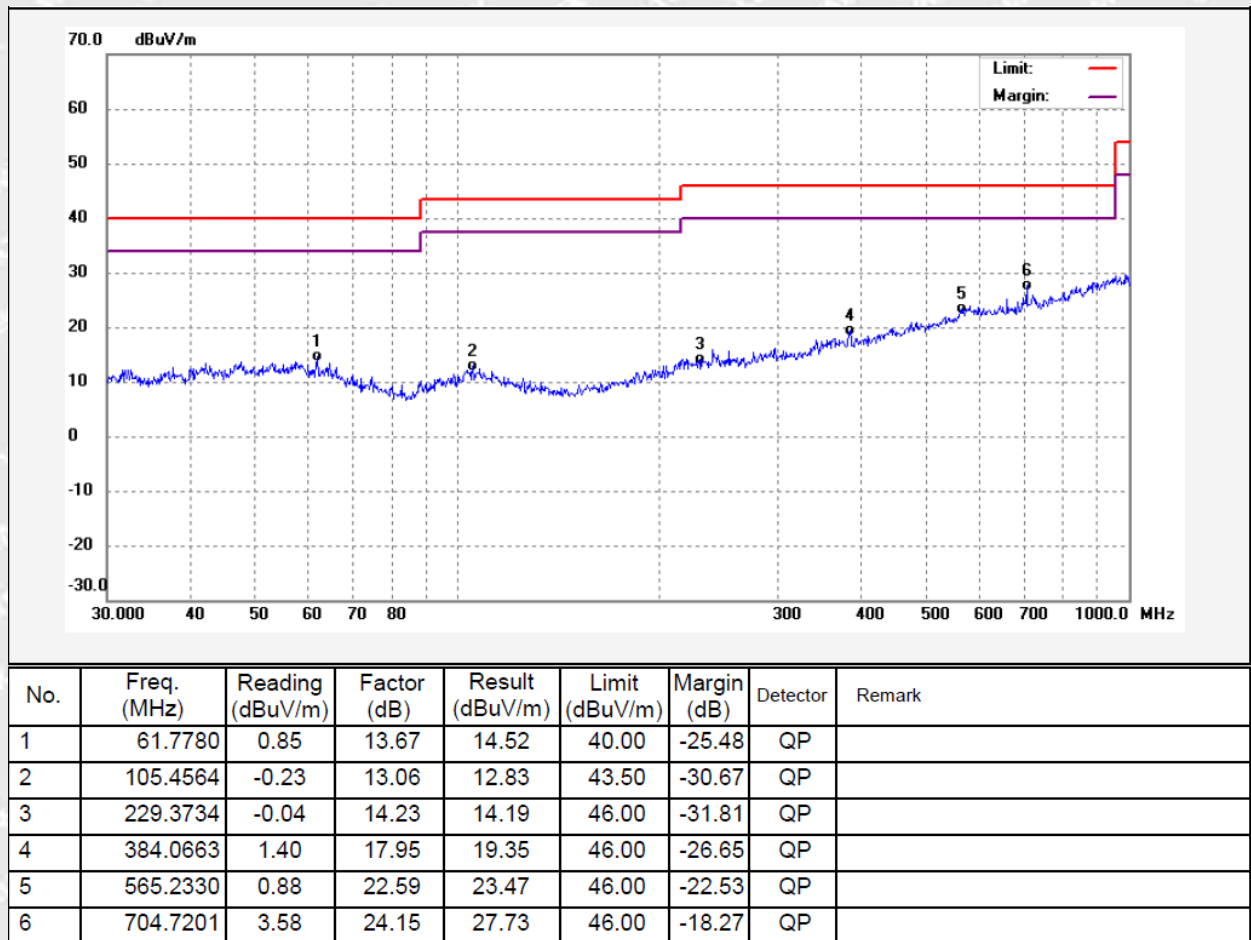


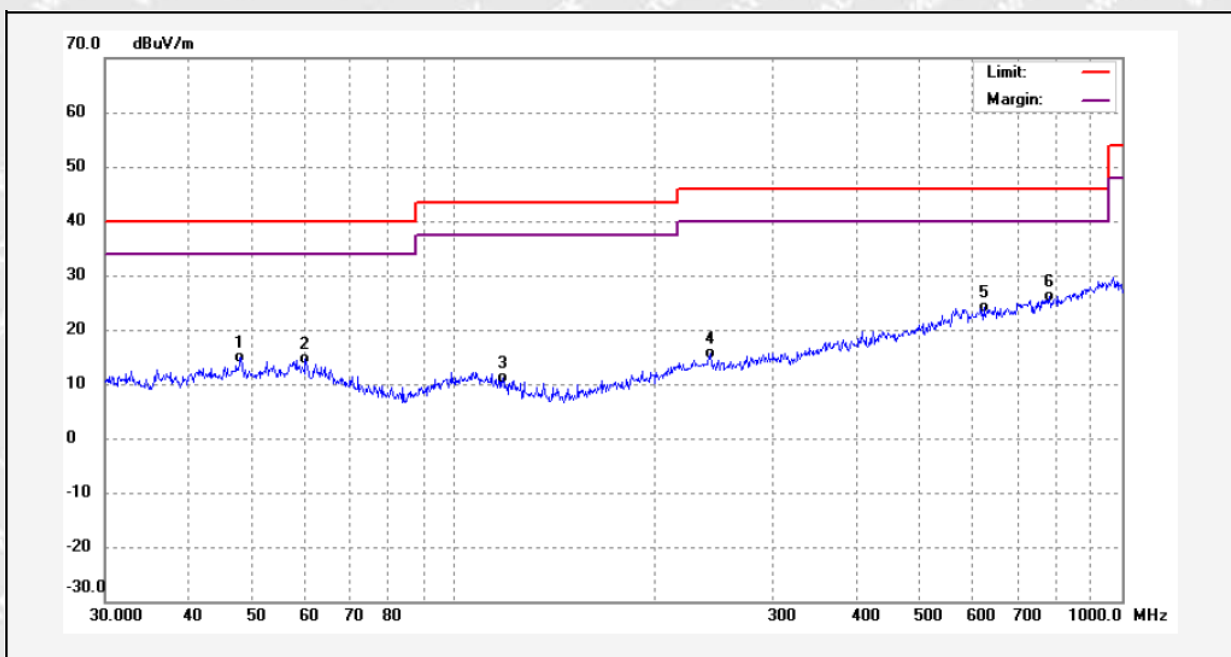


Test Model: HJSR96
Test Channel: Middle Channel

Test Frequency: Below 1GHz
Polarization: Vertical



**Test Model:** HJSR96**Test Frequency:** Below 1GHz**Test Channel:** Middle Channel**Polarization:** Horizontal

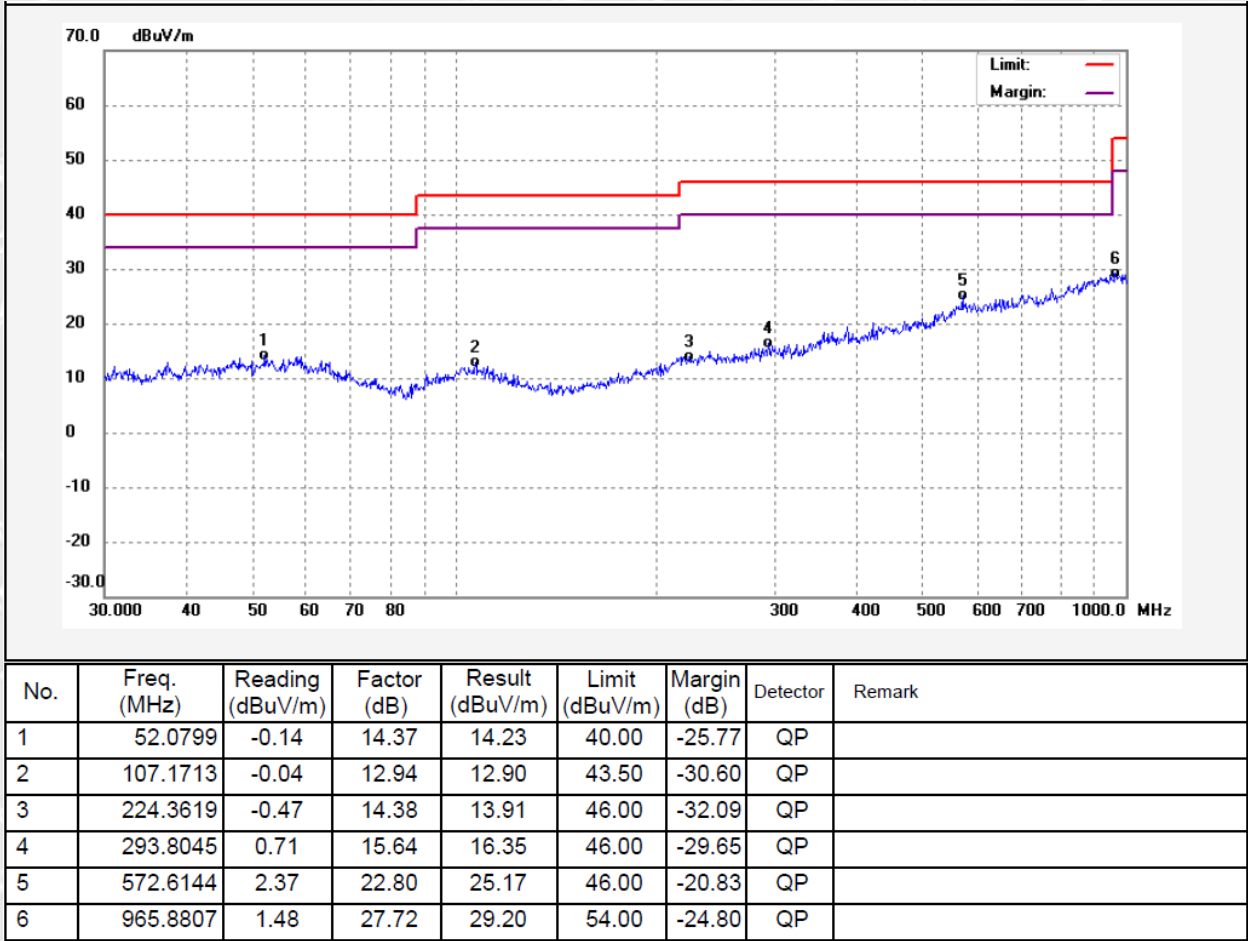
**Test Model:** HJSR96**Test Frequency:** Below 1GHz**Test Channel:** Highest Channel**Polarization:** Vertical

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	47.9940	0.39	14.43	14.82	40.00	-25.18	QP	
2	60.0059	0.66	13.86	14.52	40.00	-25.48	QP	
3	118.1862	-0.48	11.55	11.07	43.50	-32.43	QP	
4	242.5252	1.11	14.57	15.68	46.00	-30.32	QP	
5	621.1451	1.24	22.95	24.19	46.00	-21.81	QP	
6	782.0710	1.02	25.23	26.25	46.00	-19.75	QP	



Test Model: HJSR96
Test Channel: Highest Channel

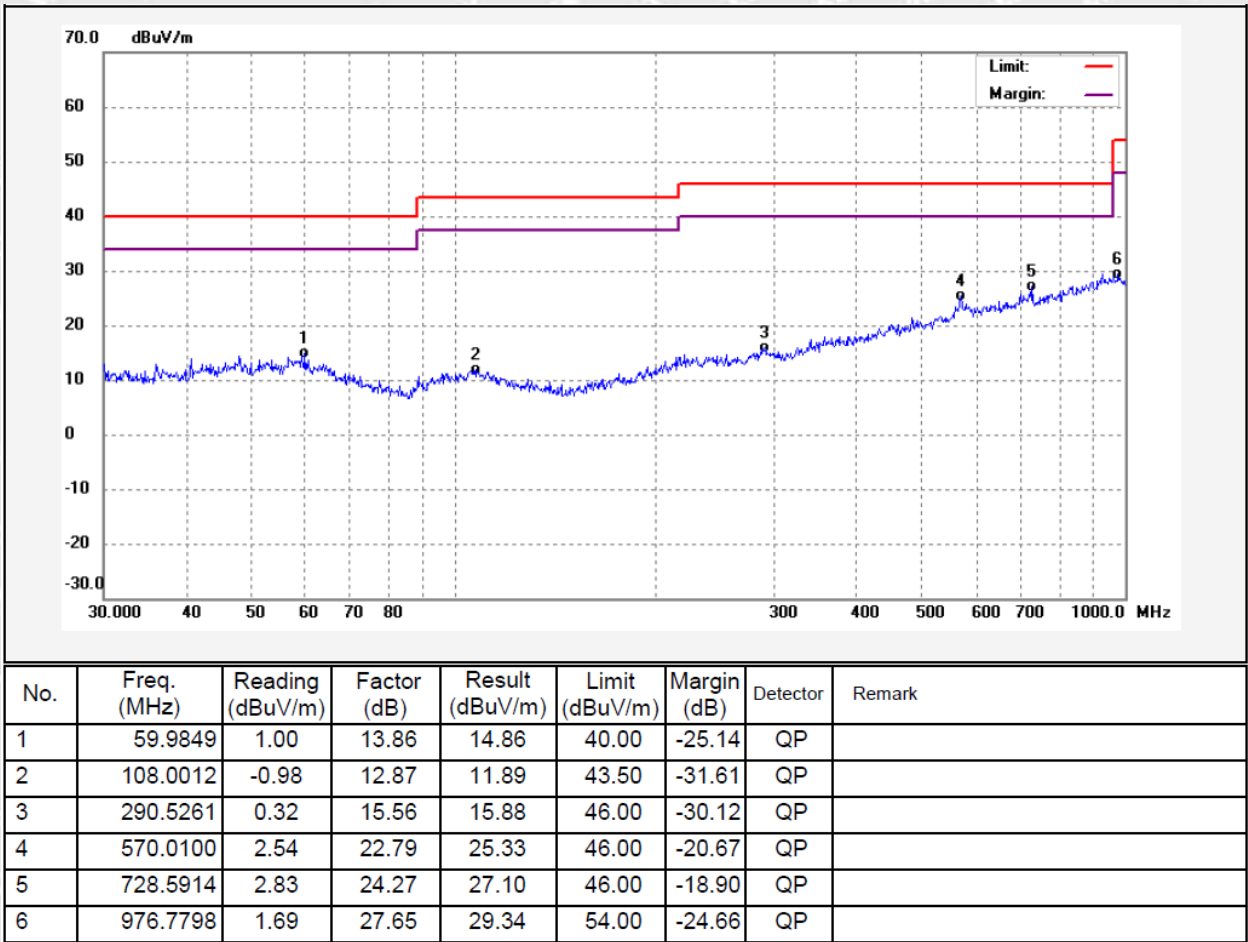
Test Frequency: Below 1GHz
Polarization: Horizontal





Test Model: HJSR96B
Test Channel: Lowest Channel

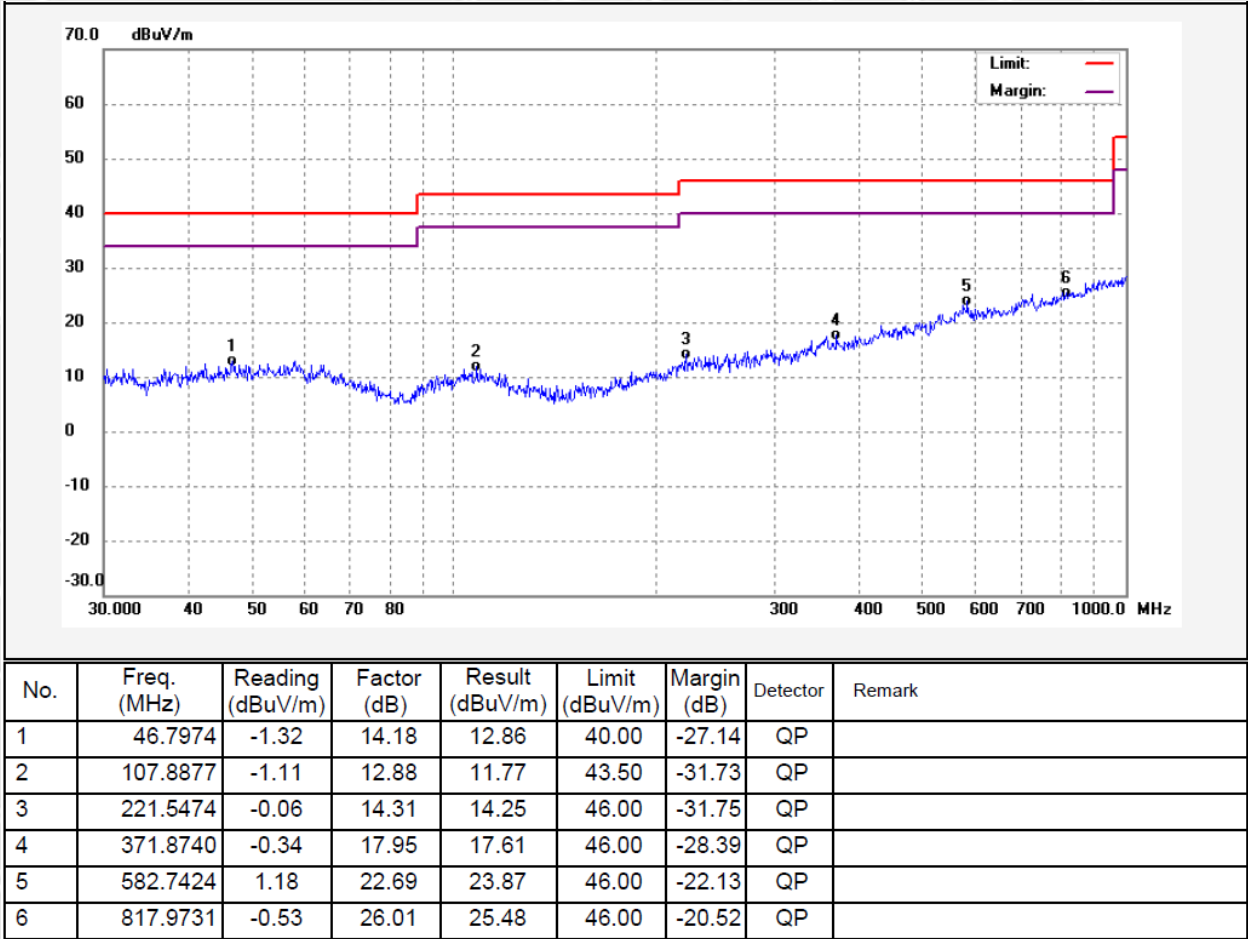
Test Frequency: Below 1GHz
Polarization: Vertical





Test Model: HJSR96B
Test Channel: Lowest Channel

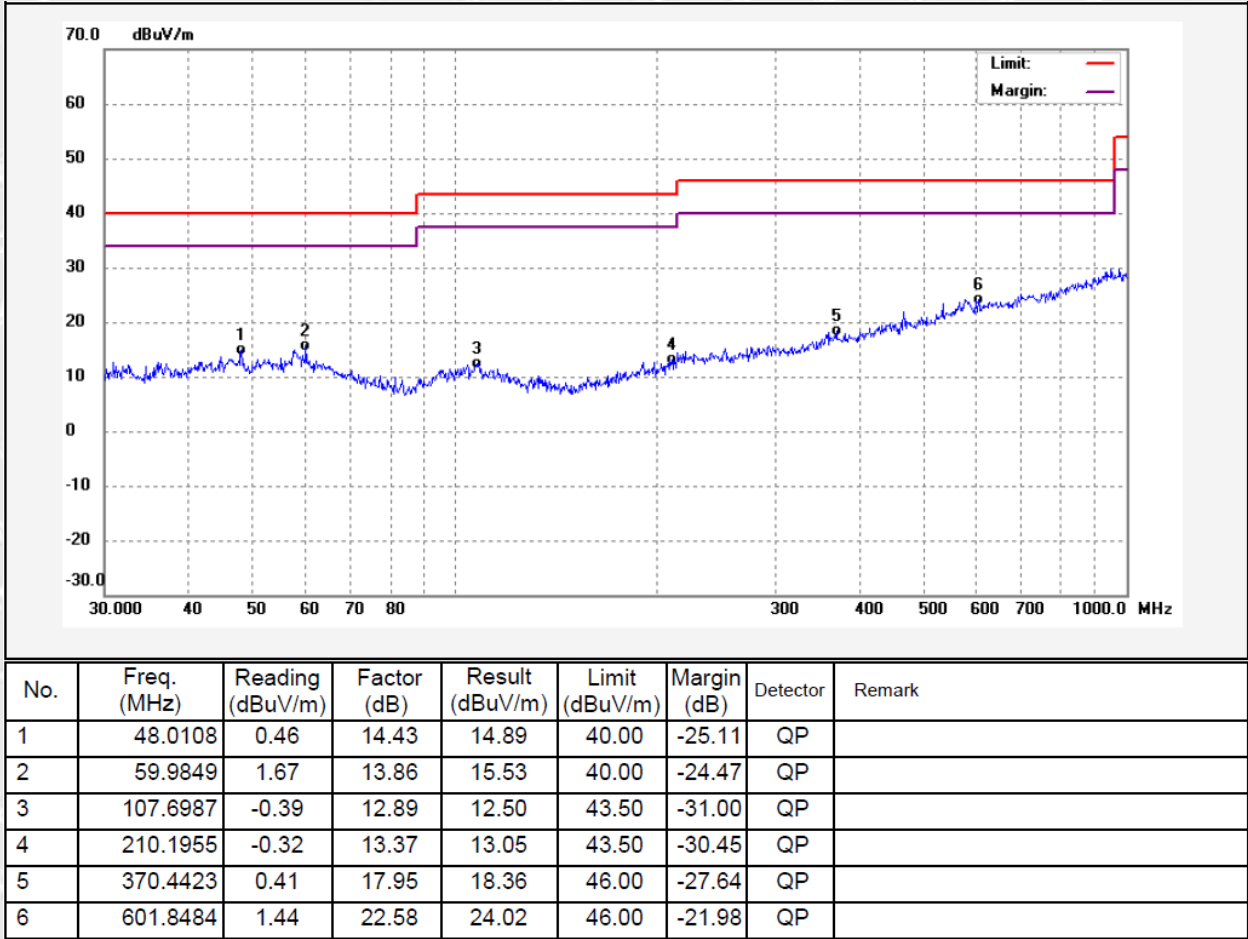
Test Frequency: Below 1GHz
Polarization: Horizontal

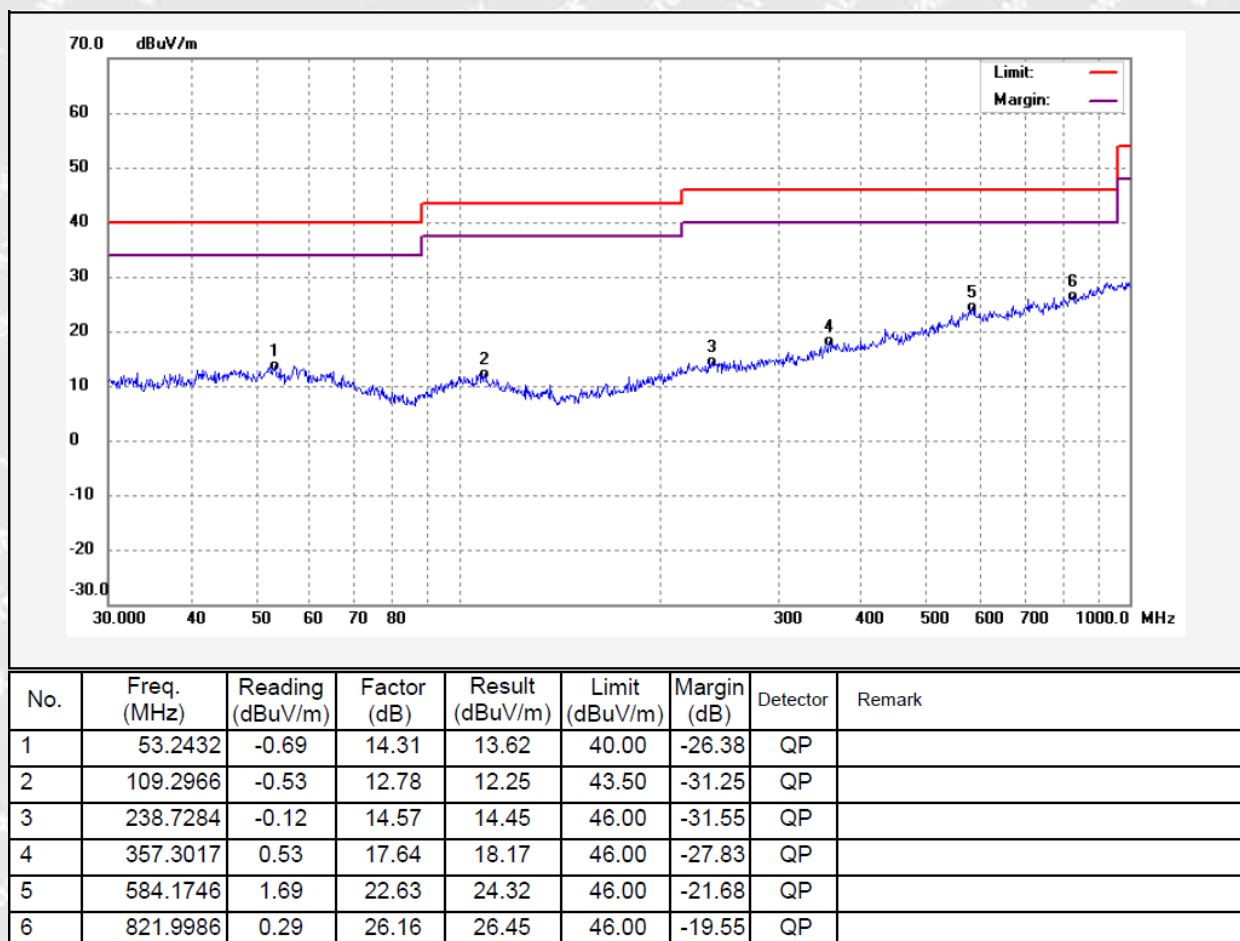




Test Model: HJSR96B
Test Channel: Middle Channel

Test Frequency: Below 1GHz
Polarization: Vertical

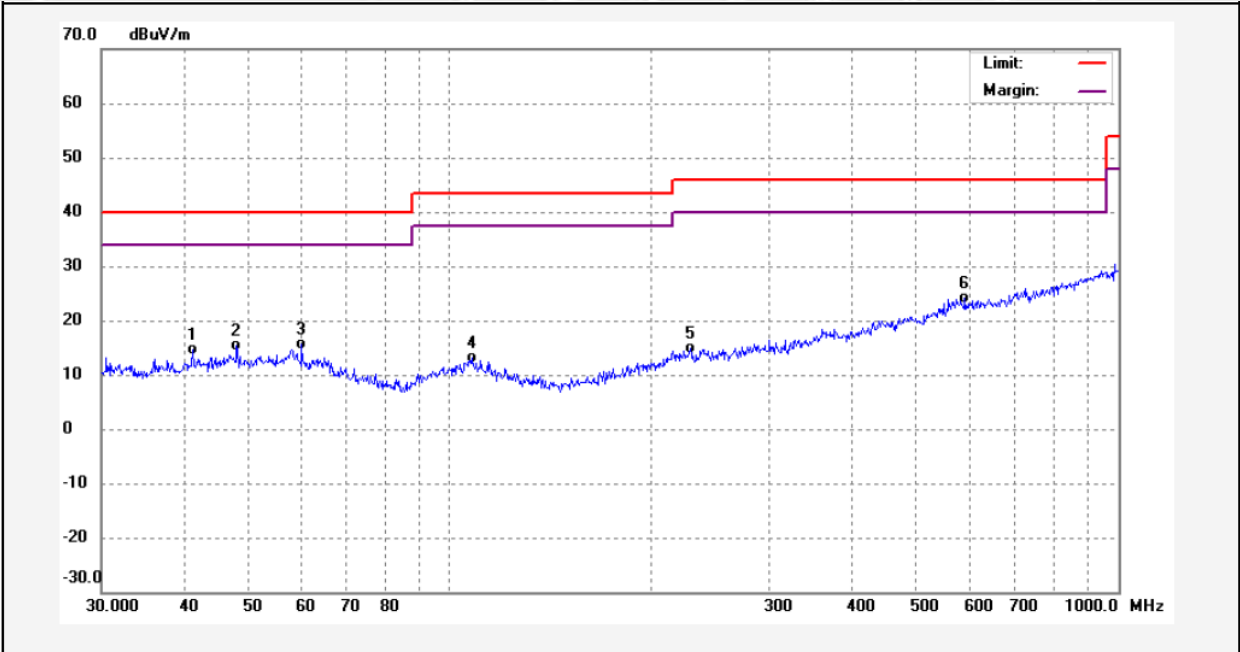


**Test Model:** HJSR96B**Test Frequency:** Below 1GHz**Test Channel:** Middle Channel**Polarization:** Horizontal



Test Model: HJSR96B
Test Channel: Highest Channel

Test Frequency: Below 1GHz
Polarization: Vertical

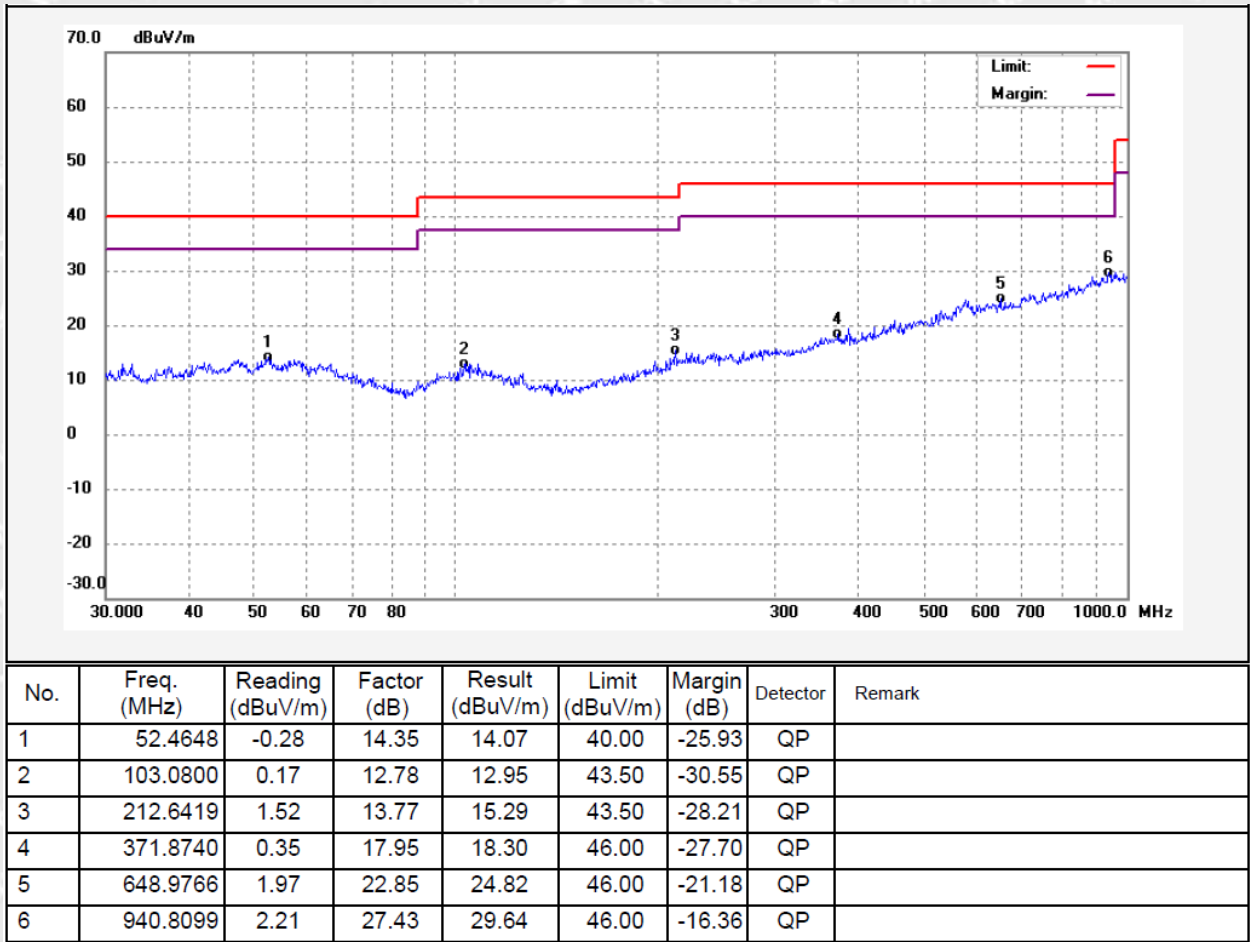


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	41.2621	1.06	13.55	14.61	40.00	-25.39	QP	
2	47.9772	0.90	14.43	15.33	40.00	-24.67	QP	
3	59.9849	1.86	13.86	15.72	40.00	-24.28	QP	
4	107.6610	0.22	12.90	13.12	43.50	-30.38	QP	
5	228.8914	0.74	14.25	14.99	46.00	-31.01	QP	
6	588.9051	1.67	22.40	24.07	46.00	-21.93	QP	



Test Model: HJSR96B
Test Channel: Highest Channel

Test Frequency: Below 1GHz
Polarization: Horizontal



**Test Frequency: Above 1GHz**

Model HJSR96							
CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2405	77.65	-10.42	114	36.35	PK
	V	2405	79.78	-10.17	114	34.22	PK
	H	2390	37.45	-10.47	74	36.55	PK
	H	2390	28.43	-10.47	54	25.57	AV
	V	2390	37.92	-10.23	74	36.08	PK
	V	2390	28.55	-10.23	54	25.45	AV
	H	4810	44.39	-3.59	74	29.61	PK
	H	4810	34.52	-3.59	54	19.48	AV
	V	4810	44.64	-3.46	74	29.36	PK
	V	4810	34.83	-3.46	54	19.17	AV
	H	7215	42.39	3.07	74	31.61	PK
	V	7215	33.91	2.97	74	40.09	PK
M	H	2440	77.95	-10.28	114	36.05	PK
	V	2440	80.4	-10.01	114	33.6	PK
	H	4880	44.17	-3.41	74	29.83	PK
	H	4880	34.35	-3.41	54	19.65	AV
	V	4880	45.86	-3.26	74	28.14	PK
	V	4880	34.89	-3.26	54	19.11	AV
H	H	2480	77.94	-10.12	114	36.06	PK
	V	2480	79.2	-9.83	114	34.8	PK
	H	2483.5	41.35	-10.11	74	32.65	PK
	H	2483.5	31.66	-10.11	54	22.34	AV
	V	2483.5	42.89	-9.82	74	31.11	PK
	V	2483.5	33.08	-9.82	54	20.92	AV
	H	4960	42.85	-3.22	74	31.15	PK
	H	4960	32.98	-3.22	54	21.02	AV
	V	4960	43.95	-3.03	74	30.05	PK
	V	4960	34.24	-3.03	54	19.76	AV



Model HJSR96B							
CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2405	77.71	-10.42	114	36.29	PK
	V	2405	79.58	-10.17	114	34.42	PK
	H	2390	36.91	-10.47	74	37.09	PK
	H	2390	28.61	-10.47	54	25.39	AV
	V	2390	37.46	-10.23	74	36.54	PK
	V	2390	27.05	-10.23	54	26.95	AV
	H	4810	44.29	-3.59	74	29.71	PK
	H	4810	34.91	-3.59	54	19.09	AV
	V	4810	44.37	-3.46	74	29.63	PK
	V	4810	34.02	-3.46	54	19.98	AV
	H	7215	42.83	3.07	74	31.17	PK
	V	7215	33.75	2.97	74	40.25	PK
M	H	2440	77.15	-10.28	114	36.85	PK
	V	2440	80.07	-10.01	114	33.93	PK
	H	4880	44.16	-3.41	74	29.84	PK
	H	4880	35.24	-3.41	54	18.76	AV
	V	4880	45.73	-3.26	74	28.27	PK
	V	4880	34.94	-3.26	54	19.06	AV
H	H	2480	77.51	-10.12	114	36.49	PK
	V	2480	79.34	-9.83	114	34.66	PK
	H	2483.5	41.74	-10.11	74	32.26	PK
	H	2483.5	31.64	-10.11	54	22.36	AV
	V	2483.5	42.33	-9.82	74	31.67	PK
	V	2483.5	33.22	-9.82	54	20.78	AV
	H	4960	42.67	-3.22	74	31.33	PK
	H	4960	32.04	-3.22	54	21.96	AV
	V	4960	43.82	-3.03	74	30.18	PK
	V	4960	34.56	-3.03	54	19.44	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz..



7 Photographs Test Setup

7.1 Photographs - Radiated Emission Test Setup

30MHz-1GHz



Above 1GHz





8 Photographs - Constructional Details

8.1 EUT - External Photos

Model HJSR96









Model HJSR96B









Model HJSR96C





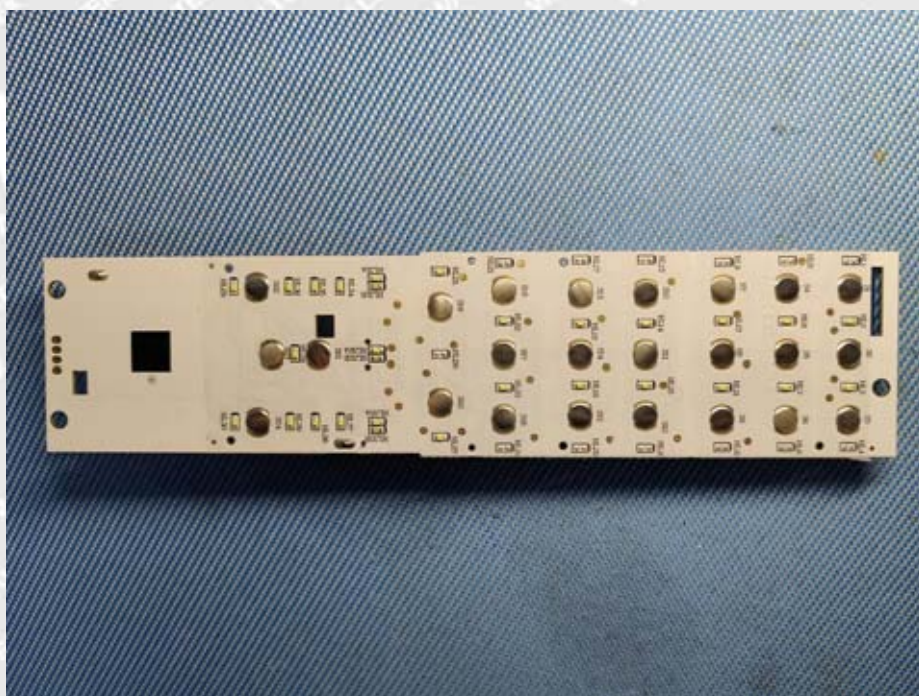
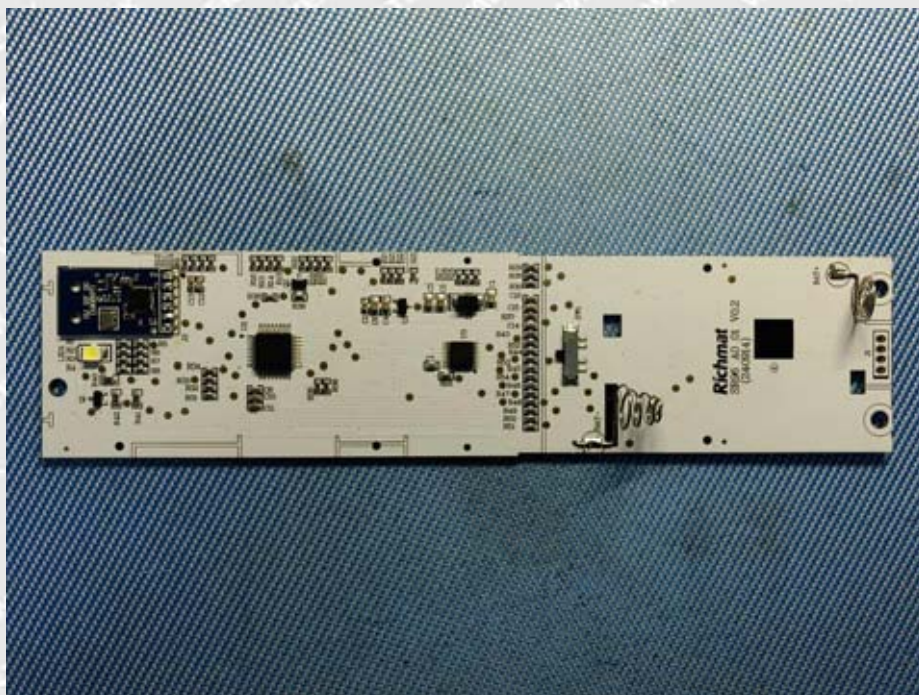


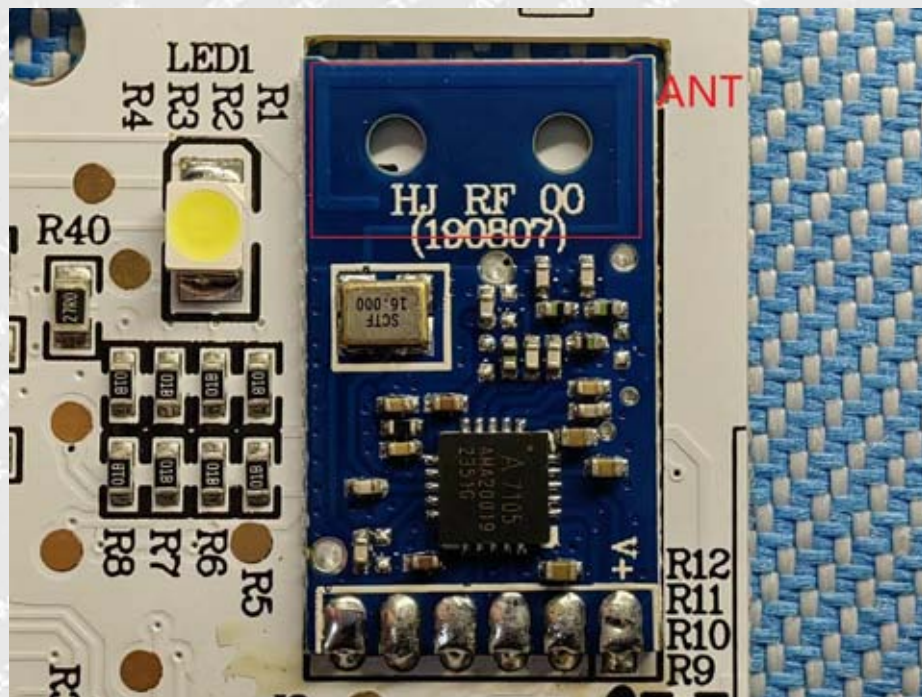


8.2 EUT – Internal Photos

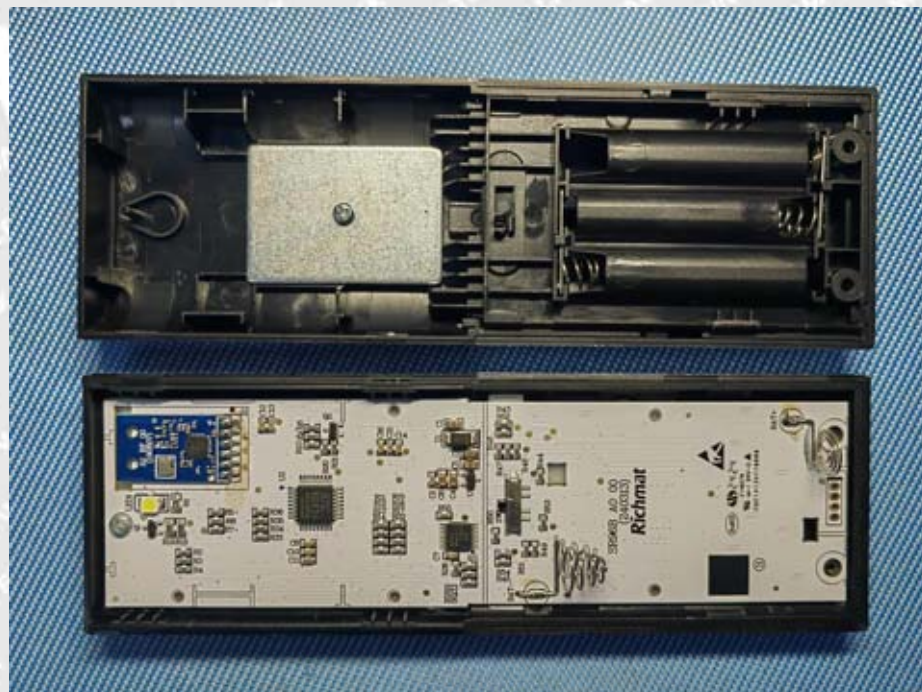
Model HJSR96

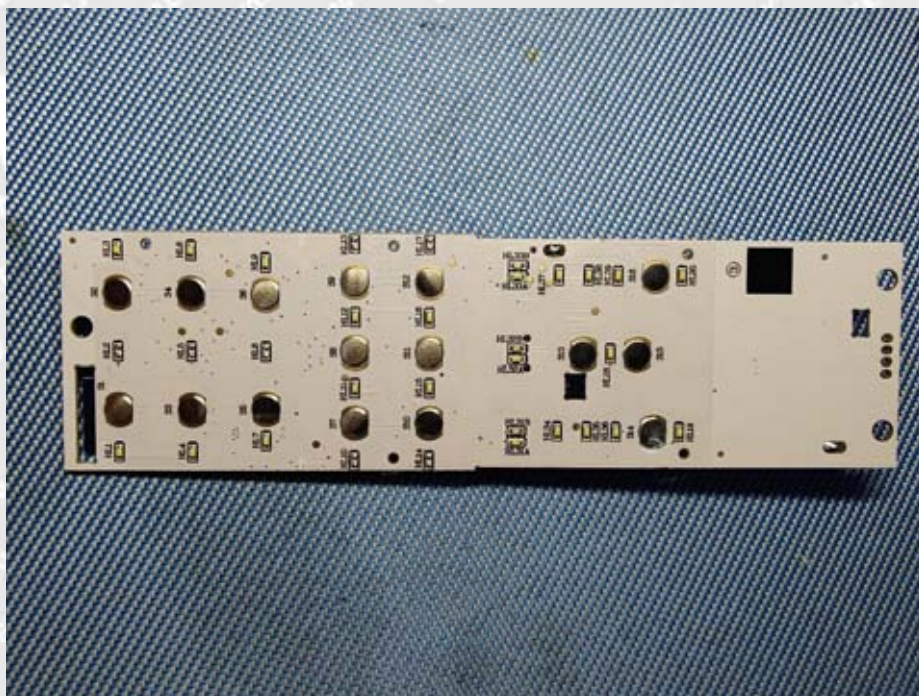
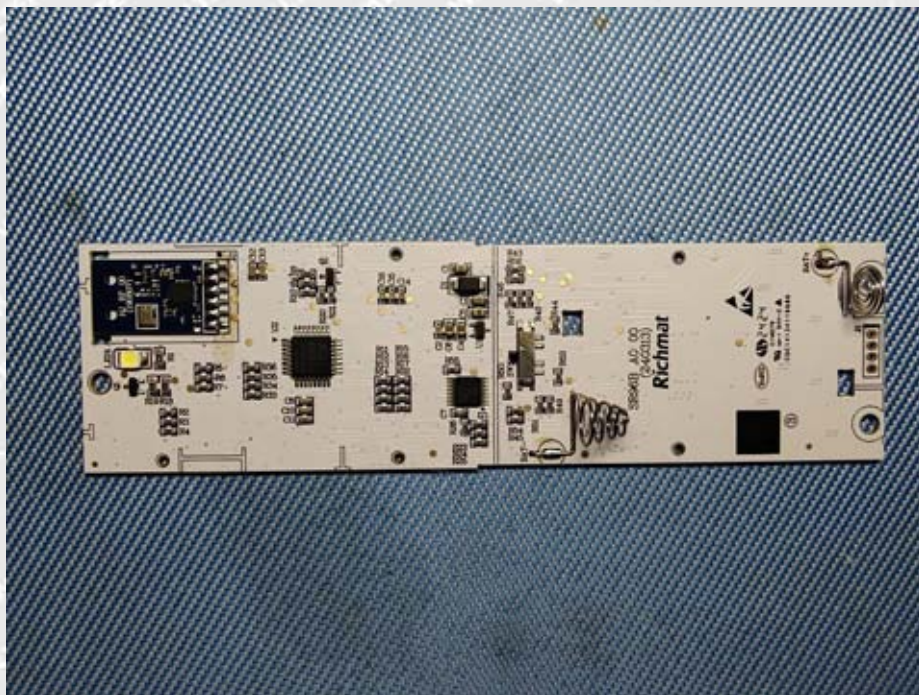


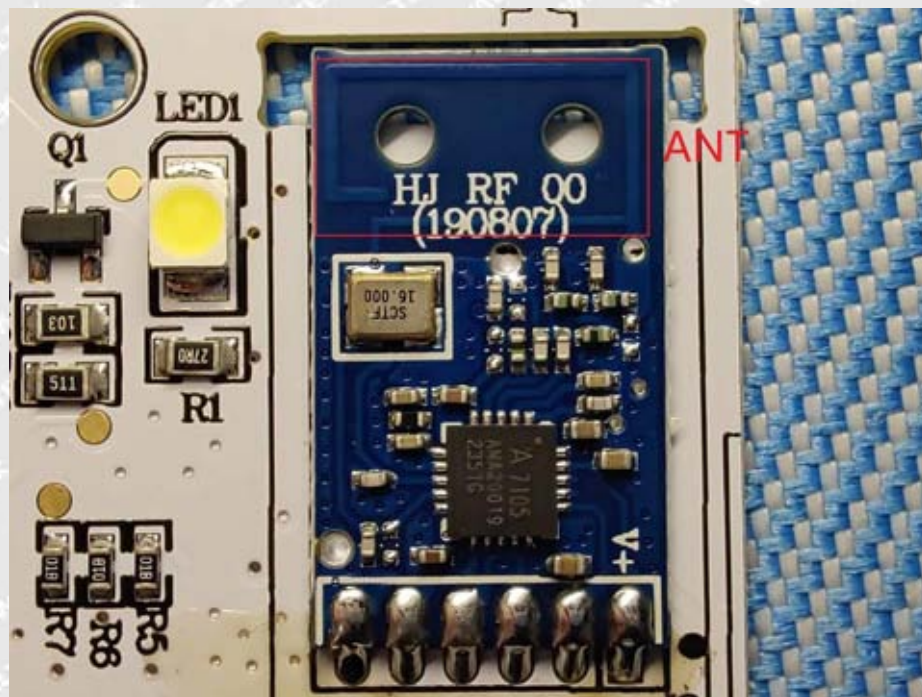


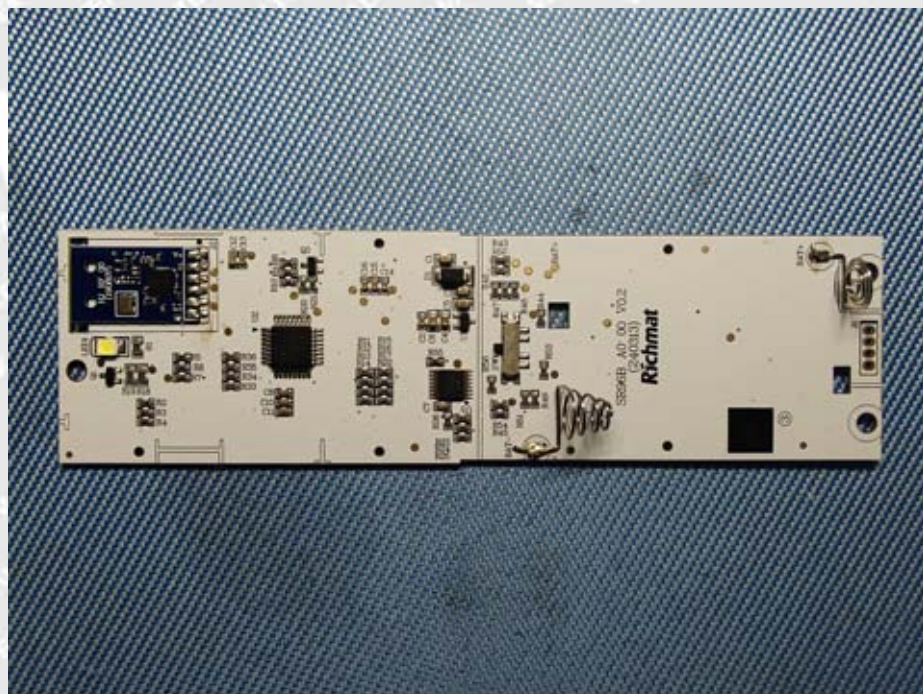
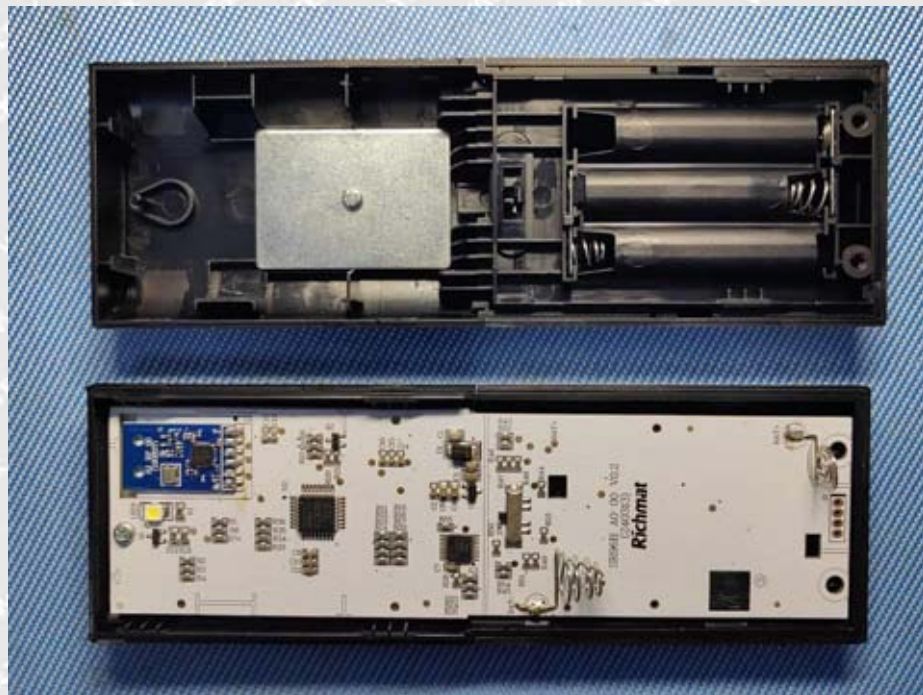


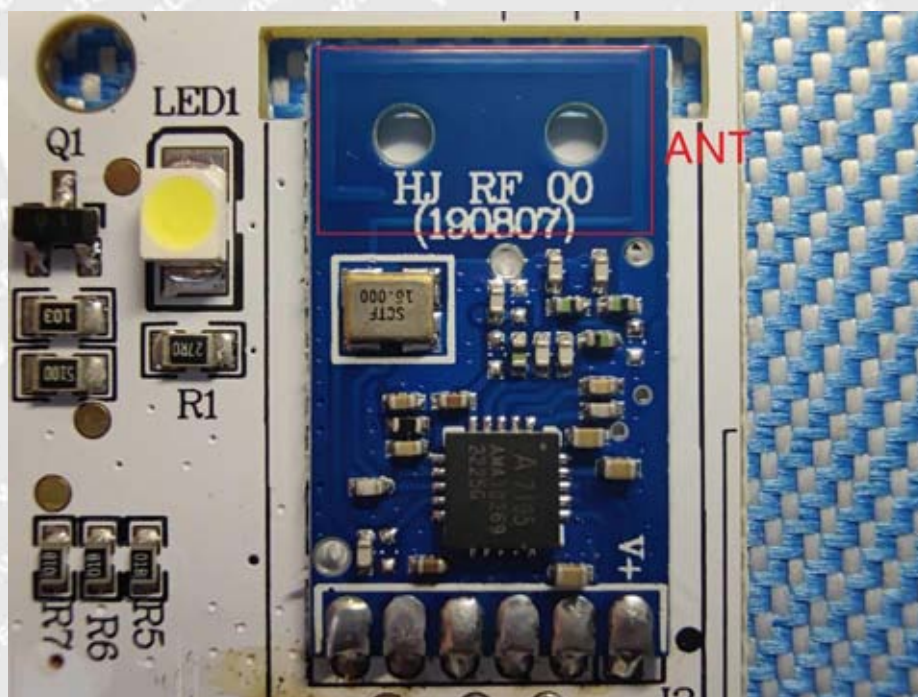
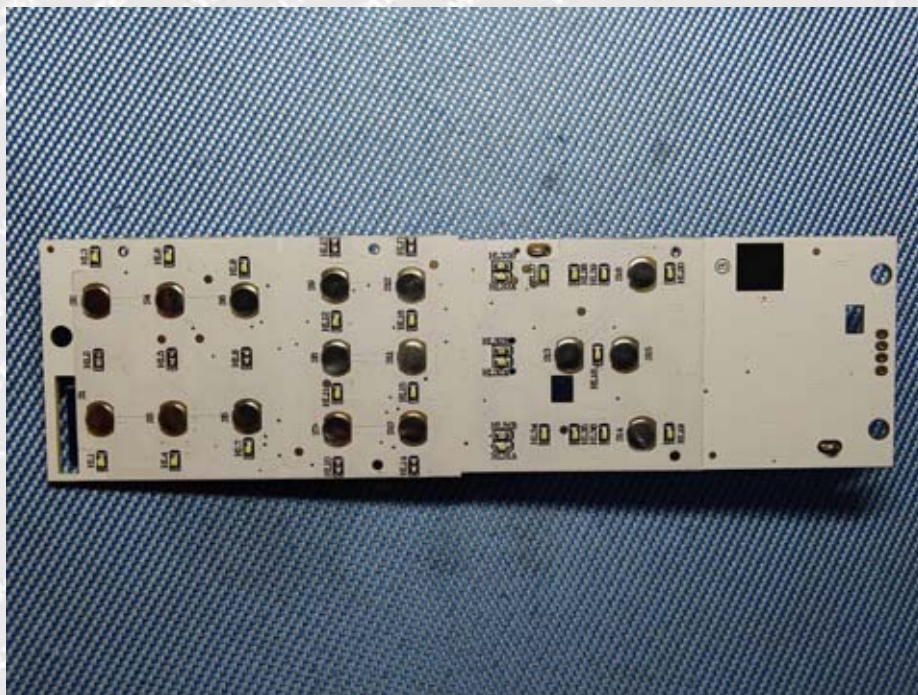
Model HJSR96B











=====End of Report=====