

TEST REPORT

Application No.: FYCR2206000234AT
Applicant: Navico Inc.
Address of Applicant: 4500 S. 129th East Avenue, Ste. 200 Tulsa Oklahoma United States 74134
Manufacturer: Navico Auckland Limited
Address of Manufacturer: Arrenway Drive, Rosedale, Auckland, 0632 New Zealand
Factory: Shenzhen Fastrain Technology Co., Ltd.
Address of Factory: No.3 Baolong 4th Rd., Baolong Industrial Area, Longgang District, Shenzhen, China

Equipment Under Test (EUT):

EUT Name: Marin VHF Radio
Model No.: V60-B, RS40-B ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark: B&G, SIMRAD
Standard(s) : 47 CFR Part 15, Subpart B
Date of Receipt: 2022-06-14
Date of Test: 2022-06-15 to 2022-07-22
Date of Issue: 2022-07-28

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Winkey Wang
EMC Technical Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-07-28		Original

Authorized for issue by:				
		Tree Zhan		
		Tree Zhan/Project Engineer		
		Winkey Wang		
		Winkey Wang/Reviewer		



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2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	15.109(a);Class B	Pass
Radiated Emissions (Above 1GHz)		ANSI C63.4:2014	15.109(g);Class B	Pass

Remark:

Model No.: V60-B, RS40-B

Only the model V60-B was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only differences are the trade name and model no. for trading purpose.



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Shenzhen Branch

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4 General Information

4.1 Details of E.U.T.

Power supply:	12 VDC battery system
Cable:	DC cable: longer than 300cm unshielded
Sample Type:	Mobile device
Internal Source:	More than 108MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC power	ZHAOXIN	RXN-305D	REF. No.SEA2700
Coaxial Attenuator	Provided by client	TS4	HYT168793
Cell Site Test Set	HP	8921A	3633A04615
Audio Analyzer	Rohde & Schwarz	UPV	SEM008-03
GNSS Antenna	Navico	GPS-500	/

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions (30MHz-1GHz)	$\pm 3.1\text{dB}$ (Below 1GHz)
Radiated Emissions (Above 1GHz)	$\pm 4.4\text{dB}$ (Above 1GHz)
Remark: The U_{lab} (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	



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4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc. Shenzhen branch.

Fuyong lab. Xinlong TechnoPark, Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China

Tel: +86 755 8866 3988 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- **A2LA (Certificate No. 6606.01)**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 6606.01.

- **FCC –Designation Number: CN1322**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

- **Innovation, Science and Economic Development Canada**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11

Radiated Emissions (Above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIIO	BDLNA-0118-	SEM005-05	2022/7/12	2023/7/11



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		352810			
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-22	2021-07-13	2022-07-12
				2022-07-11	2023-07-10
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-23	2021-07-13	2022-07-12
				2022-07-11	2023-07-10
Barometer	DUMAI	DYM3	SEM002-24	2021-07-13	2022-07-12
				2022-07-11	2023-07-10



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6 Emission Test Results

6.1 Radiated Emissions (30MHz-1GHz)

Test Requirement: 47 CFR Part 15, Subpart B

Test Method: ANSI C63.4:2014

Measurement Distance: 3m

Limit:

FREQUENCY (MHz)	dBμV/m (At 10m)	dBμV/m (At 3m)
	Class B	Class B
30MHz -88MHz	29.5	40.0
88MHz-216MHz	33.1	43.5
216MHz-960MHz	35.6	46.0
960MHz-1000MHz	43.5	54.0
Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz		

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C

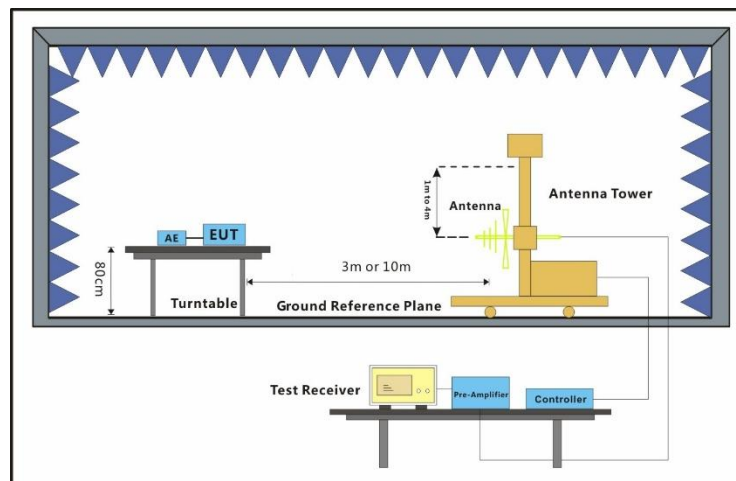
Humidity: 60.3 % RH

Atmospheric Pressure: 1020 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Blank

6.1.3 Test Setup Diagram



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6.1.4 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

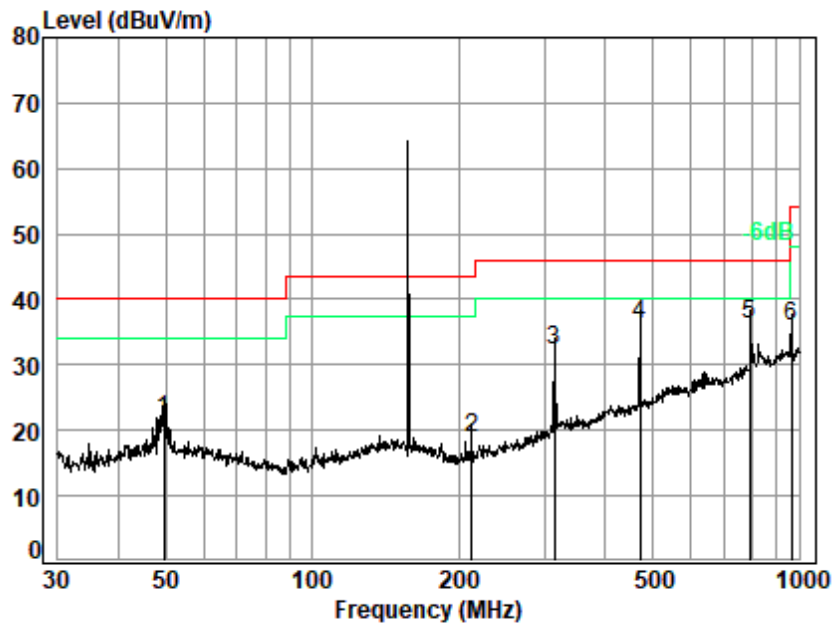
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00234AT
Mode : 00

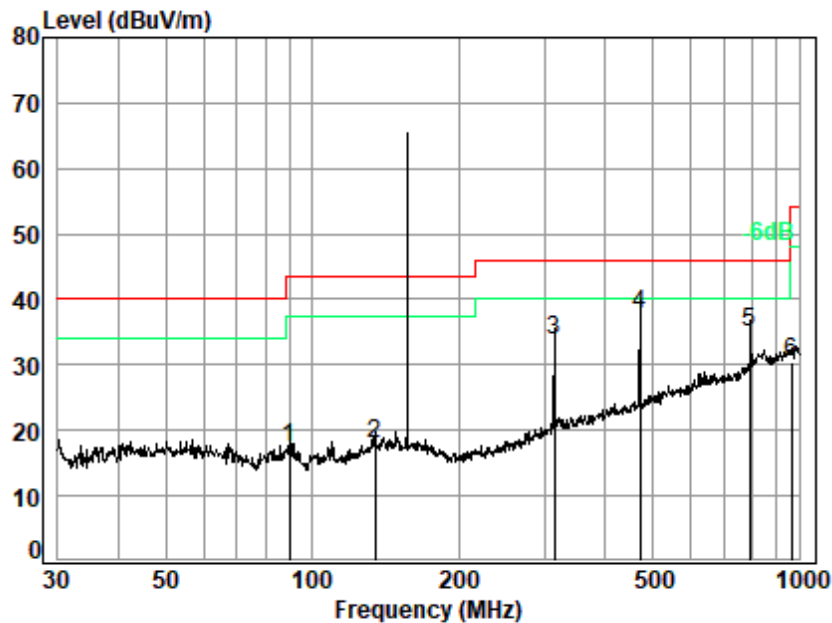
		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	49.5328	0.22	17.35	25.86	29.82	21.53	40.00	-18.47 QP
2	212.2695	0.73	15.60	25.32	27.94	18.95	43.50	-24.55 QP
3	314.3765	1.16	18.99	25.21	37.21	32.15	46.00	-13.85 QP
4	470.5232	1.43	21.88	26.20	39.14	36.25	46.00	-9.75 QP
5	793.3960	2.57	27.04	26.61	33.26	36.26	46.00	-9.74 QP
6	965.5421	2.25	29.20	26.26	30.58	35.77	54.00	-18.23 QP



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Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00234AT
Mode : 00

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	89.9047	0.67	13.61	25.81	28.86	17.33	43.50	-26.17 QP
2	134.5592	0.92	17.00	25.61	25.55	17.86	43.50	-25.64 QP
3	314.3765	1.16	18.99	25.21	38.70	33.64	46.00	-12.36 QP
4	470.5232	1.43	21.88	26.20	40.74	37.85	46.00	-8.15 QP
5	793.3960	2.57	27.04	26.61	31.91	34.91	46.00	-11.09 QP
6	965.5421	2.25	29.20	26.26	25.30	30.49	54.00	-23.51 QP



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6.2 Radiated Emissions (Above 1GHz)

Test Requirement: 47 CFR Part 15, Subpart B
 Test Method: ANSI C63.4:2014
 Measurement Distance: 3m
 Limit:
 Above 1GHz 74(dBμV/m) peak, 54(dBμV/m) average at 3m distance
 83.54(dBμV/m) peak, 63.54(dBμV/m) average at 1m distance
 Detector: Peak for pre-scan (1MHz resolution bandwidth) 1GHz to 40GHz

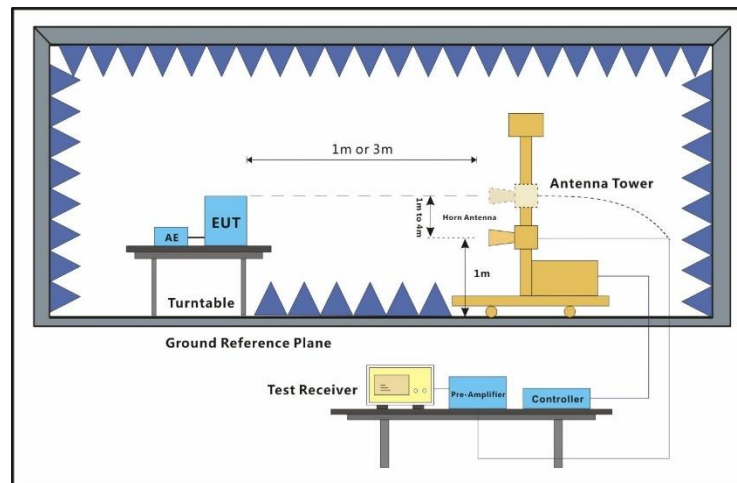
6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.5 °C Humidity: 60.3 % RH Atmospheric Pressure: 1020 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal Working_Blank

6.2.3 Test Setup Diagram



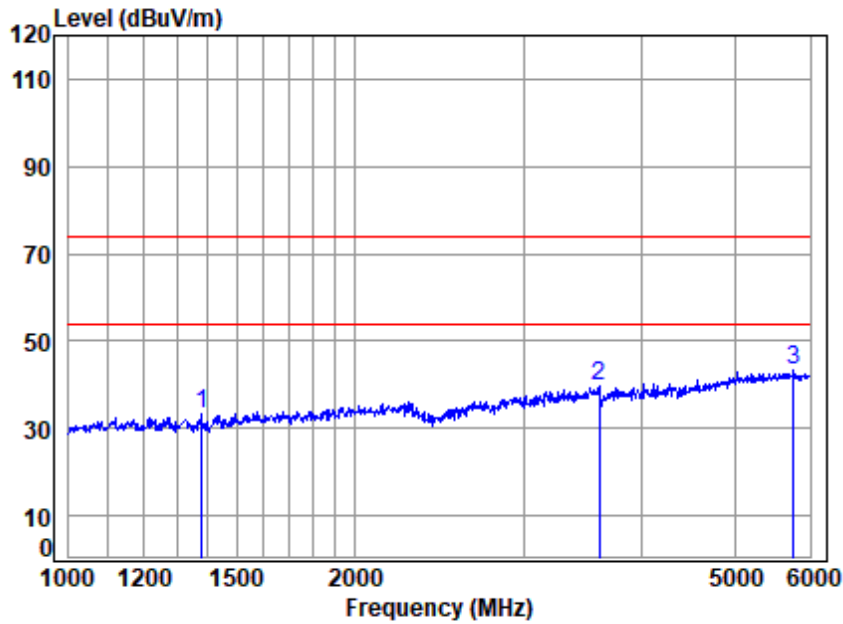
6.2.4 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.

The red line show in graphic is the limit in standard used in this section.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Test Mode: 00; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00234AT
Mode : 00
Note :

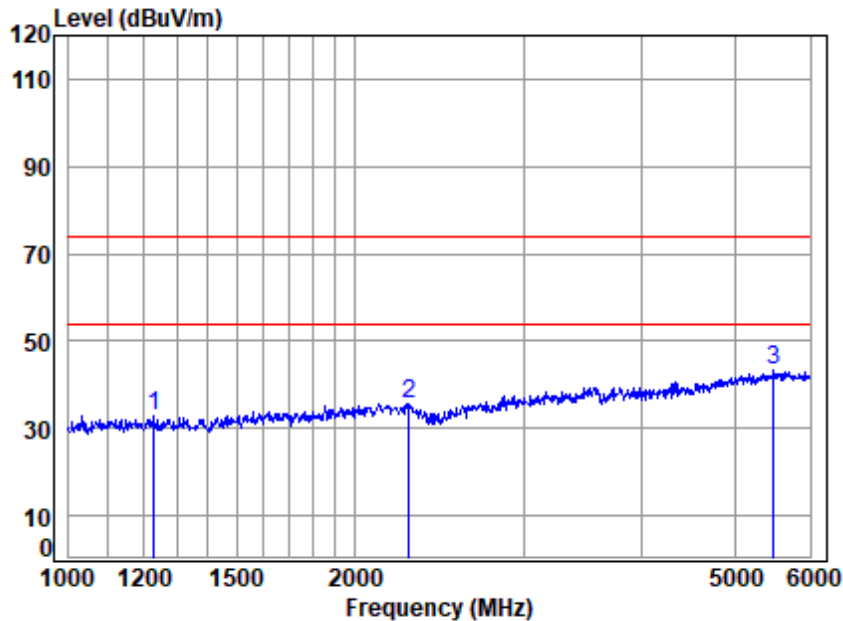
		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1378.1260	3.53	24.21	52.78	58.17	33.13	74.00	-40.87	Peak
2	3600.6270	7.10	28.87	52.91	56.45	39.51	74.00	-34.49	Peak
3	5768.0880	7.93	32.49	52.86	55.57	43.13	74.00	-30.87	Peak



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Test Mode: 00; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00234AT
Mode : 00
Note :

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1228.8180	3.21	24.28	52.68	57.98	32.79	74.00	-41.21	Peak
2	2275.9960	4.97	26.90	53.10	57.01	35.78	74.00	-38.22	Peak
3	5495.6850	8.27	32.59	52.94	55.20	43.12	74.00	-30.88	Peak

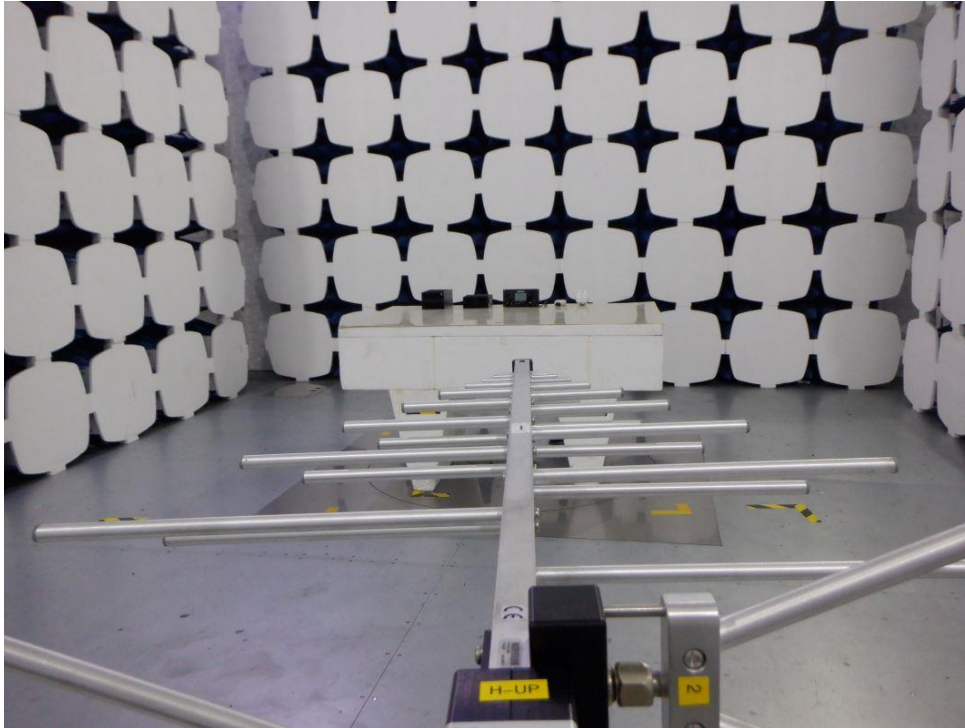


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7 Test Setup Photo

Radiated Emissions (30MHz-1GHz)



8 EUT Constructional Details (EUT Photos)

Refer to appendix - External and Internal Photos for FYCR2206000234AT.

- End of the Report -