

JAPAN MIC REPORT

for Verification

Standard : MIC Regulation of the Extremely Low Power Radio Station

EUT Type : RE-Merge

Model Name : RHS-B500

Order Number : GETEC-C1-23-359

Test Report Number : GETEC-E4-23-074

Date of Test : Jun. 07, 2023 ~ Jun. 09, 2023

Date of Issue : Jun. 19, 2023

Test Site : GUMI UNIVERSITY EMC CENTER

The following report is prepared on behalf of the RNU Co., Ltd. in accordance with "Certification Ordinance, Art. 49.20" and MIC public notice 88:2004, annex 43 or relevant ARIB STD-T66 or relevant AIR STD and MIC Public Notice 127.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

All measurements contained in this report were conducted with test method in MIC Regulation of the Extremely Low Power Radio Station.

Tested by,



Jong-Wook Park / Senior Engineer
GUMI UNIVERSITY EMC CENTER

Reviewed by,



Hyun Kim / Technical Manager
GUMI UNIVERSITY EMC CENTER



Version

Test Report No.	Date	Description
GETEC-E4-23-074	Jun. 19, 2023	- First Approval Report

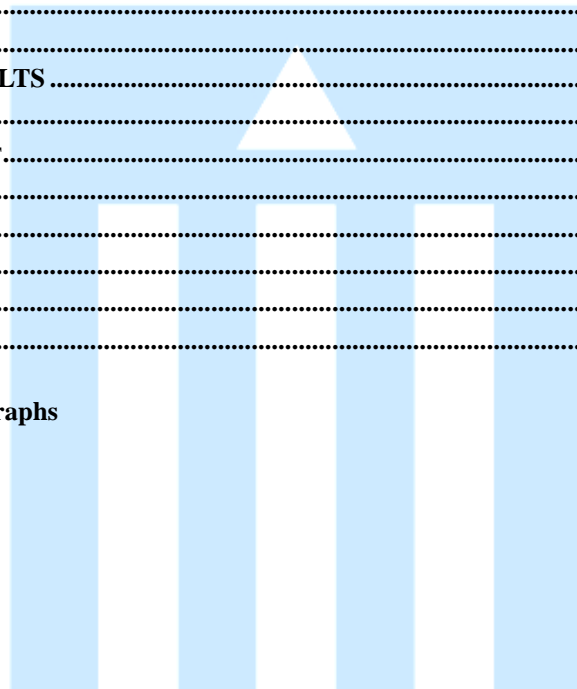




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Appendix A: Test set up photographs





1. General Information

1.1 Applicant

- Company : RNU Co., Ltd.
- Address : 41065, 58, Maeyeo-ro, Dong-gu, Daegu, Republic of Korea
- Name of Contact : Wang Lok, Do / Senior Research Engineer
- Telephone Number : +82-10-2766-7264

1.2 Manufacturer

- Company : RNU Co., Ltd.
- Address : 41065, 58, Maeyeo-ro, Dong-gu, Daegu, Republic of Korea
- Name of Contact : Wang Lok, Do / Senior Research Engineer
- Telephone Number : +82-10-2766-7264

1.3 Test laboratory

- Company : GUMI UNIVERSITY EMC CENTER
- Address : 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 39213, Republic of Korea
- Name of contact : Hyun, Kim / Technical Manager
- Telephone Number : +82-54-440-1197
- Fax Number : +82-54-440-1199



2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **RNU Co., Ltd. RE-Merge (Model name: RHS-B500)**.

These measurement tests were conducted at **GUMI UNIVERSITY EMC CENTER**.

The site address is 37 Yaeun-ro, Gumi-si, Gyeongsangbuk-do, 39213, Republic of Korea

This test site is one of the highest point of GUMI UNIVERSITY at about 200 kilometers away from Seoul city and 40 kilometers away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.

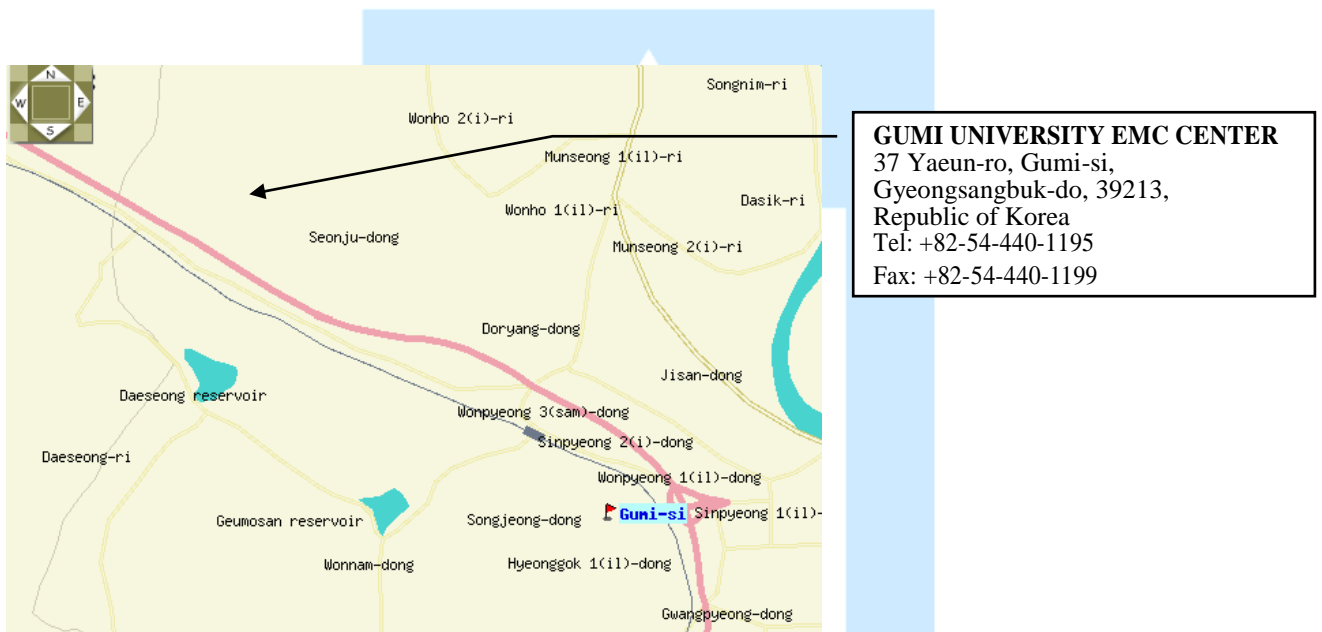


Fig 1. The map above shows the Gumi University in vicinity area.



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **RNU Co., Ltd. RE-Merge (Model Name: RHS-B500)**

- Equipment	: RE-Merge
- Model name	: RHS-B500
- Serial number	: Proto type
- Battery	: DC 3.7 V, 3000 mAh, Li-polymer
- Power supply	: DC 5 V
- Manufacturer	: RNU Co., Ltd.
- Frequency Range	: 150 kHz
- Antenna type	: WPT Coil

3.2 Definition of models

- None.

3.4 Support Equipment / Cables used

3.4.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N
-	-	-	-

3.4.2 System configuration

Description	Manufacturer	Model Name	S/N
-	-	-	-

3.4.3 Used Cable(s)

Cable Name	Condition	Description
-	-	-

3.5 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

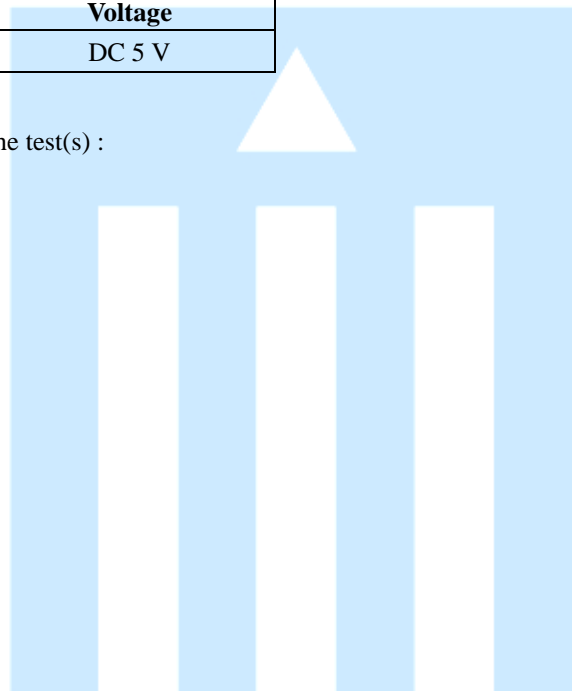
The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

- Test Frequency: 150 kHz

- Test Voltage:

Condition	Voltage
Normal	DC 5 V

- Operating condition during the test(s) :
-. WPT mode





5. SUMMARY OF TEST RESULTS

MIC Rules	Test Description	Test Result
Extremely Low Power Radio Station	Radiated Emissions	Pass



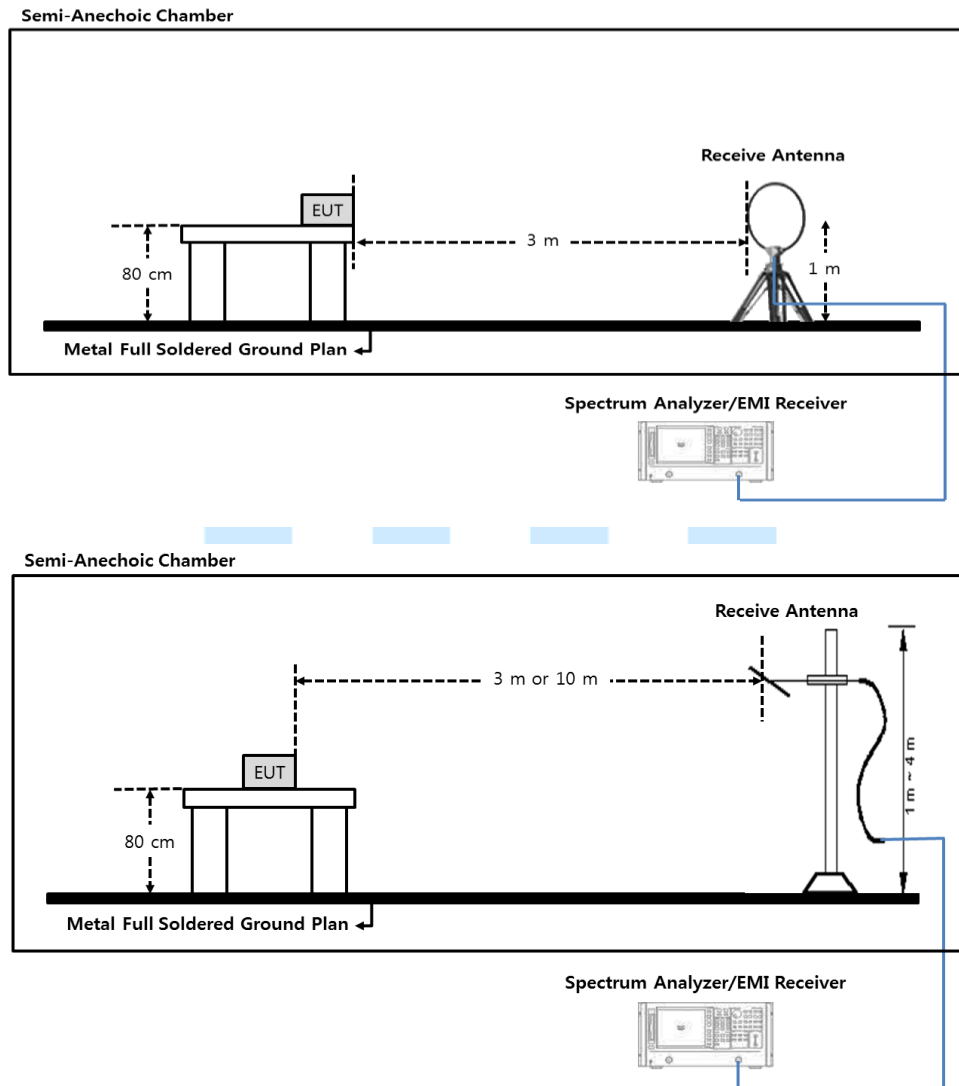


6. Radiated Emissions

6.1 Operating environment

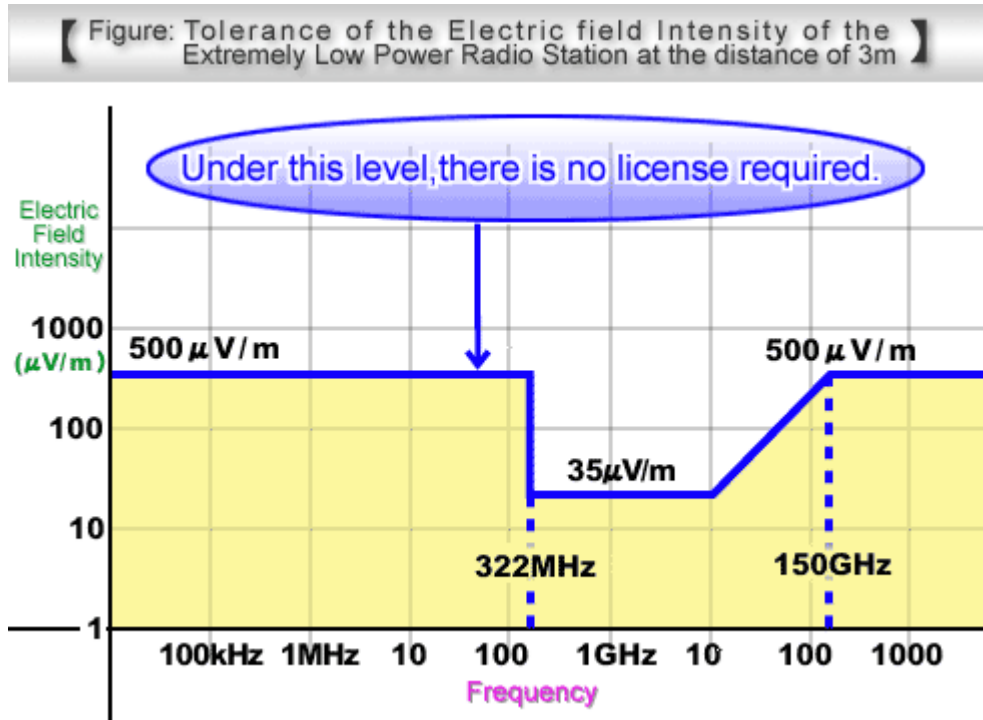
Temperature : 25.0 °C
Relative Humidity : 54.6 % R.H.

6.2 Test Set-up (Layout)



6.3 Limit

When the level of the electric field intensity (the strength of the radio wave) within 3 meters of the radio equipment is under the level shown in the following figure, there is no need for getting a license from the radio station. There is no restriction on the frequency or the purpose.



6.4 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESU 40	Rohde & Schwarz	EMI Test Receiver	100266	Apr. 04, 2024
■ - HFH2-Z2	Rohde & Schwarz	Loop ANT	100041	Apr. 14, 2024
■ - VULB9160	Schwarzbeck	Broad Band Test Antenna	3313	Sep. 28, 2023
■ - MCU066	matur GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	matur GmbH	Turntable	1390307	N/A
□ - AM 4.0	matur GmbH	Antenna Mast	1390308	N/A
■ - CO3000	Innco system GmbH	Position Controller	CO3000/1804/42 760218/P	N/A
■ - MA4640-XP-ET	Innco system GmbH	Antenna Mast	5580916	N/A



6.5 Test Test Procedure

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.



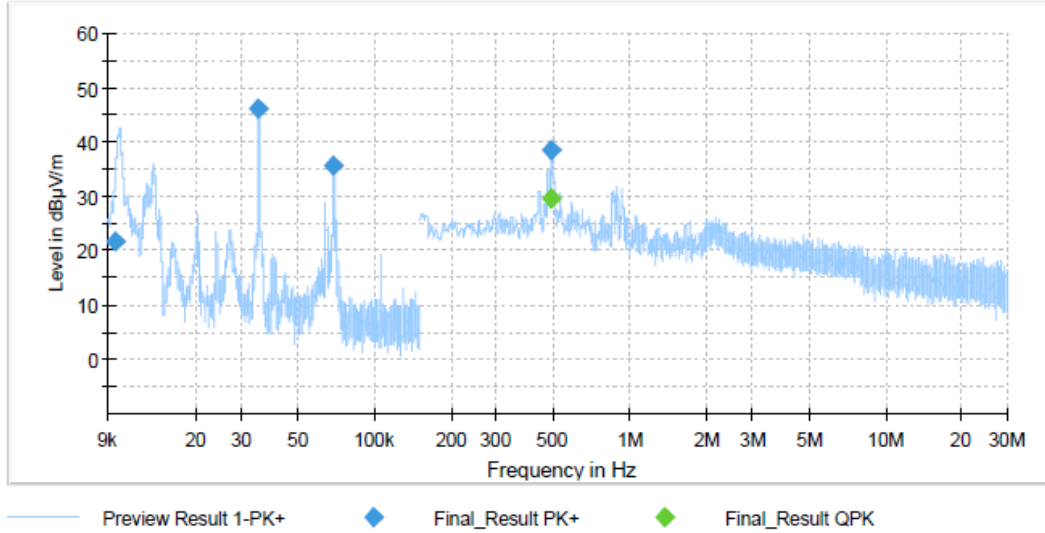
6.6 Test result & Plots

-. Test Date : Jun. 07, 2023 ~ Jun. 09, 2023

-. Operating Condition : WPT mode

Frequency (MHz)	Reading d = 0.3m (dBμV/m)	Distance factor	Reading d = 3m (dBμV/m)	Collection Factor (dB)	Final measurement			
					Result (dBμV/m)	24-20log(f) (dB)	Calculated Result (dBμV/m)	Limits (dBμV/m)
0.15	57.27	-40.00	17.27	-12.97	4.30	40.51	-36.21	53.98
Test item	Test result							
	Frequency (MHz)	Pol.	Antenna Height (cm)	Result (dBμV/m)	24-20log(f) (dB)	Calculated Result (dBμV/m)	Limits (dBμV/m)	
Spurious (9 kHz to 1 GHz)	0.035	H	100	46.94	53.12	-6.18	53.98	
	0.493	V	100	31.92	-	31.92	53.98	
	60.025	V	100	26.37	-	26.37	53.98	
	69.071	V	100	25.17	-	25.17	53.98	
	350.702	H	100	28.97	-	28.97	30.88	
	442.402	H	100	29.45	-	29.45	30.88	

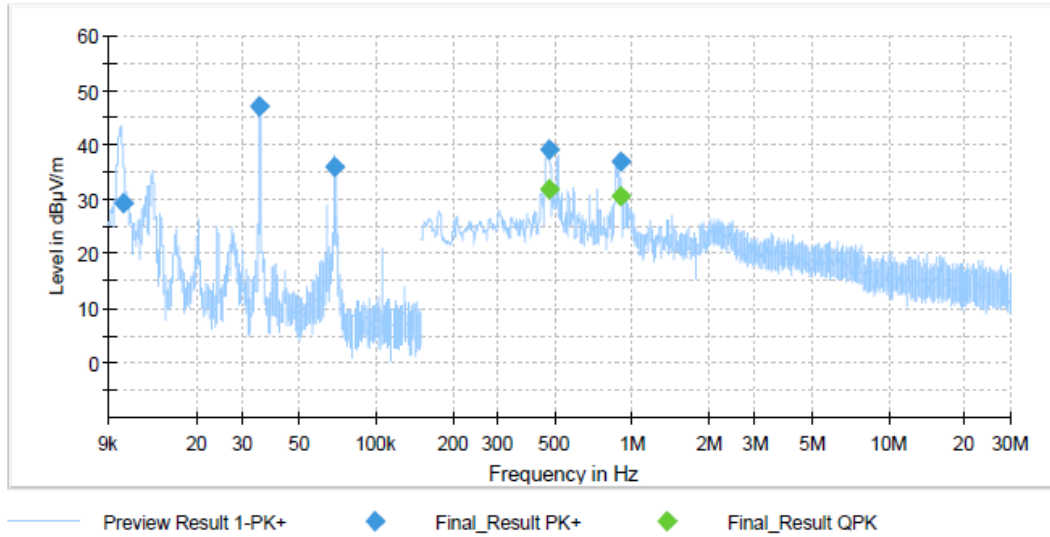




Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
0.009664	21.53	---	---	---	1000.0	0.200	H	326.0	-10.7
0.035139	46.03	---	---	---	1000.0	0.200	H	171.0	-12.7
0.069082	35.51	---	---	---	1000.0	0.200	H	85.0	-12.9
0.487260	38.42	---	---	---	1000.0	9.000	H	132.0	-12.9
0.487260	---	29.60	---	---	1000.0	9.000	H	132.0	-12.9

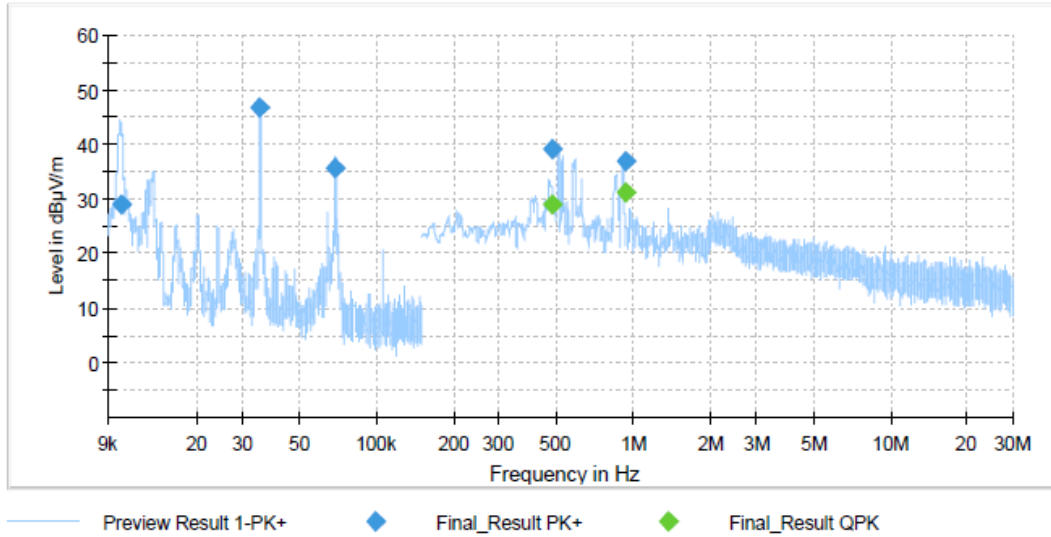
(9 kHz to 30 MHz_X)



Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
0.010200	29.41	---	---	---	1000.0	0.200	H	32.0	-10.8
0.035158	46.94	---	---	---	1000.0	0.200	H	334.0	-12.7
0.069167	35.93	---	---	---	1000.0	0.200	H	157.0	-12.9
0.478365	39.07	---	---	---	1000.0	9.000	H	103.0	-12.9
0.478365	---	31.89	---	---	1000.0	9.000	H	103.0	-12.9
0.906395	37.01	---	---	---	1000.0	9.000	H	234.0	-12.8
0.906395	---	30.67	---	---	1000.0	9.000	H	234.0	-12.8

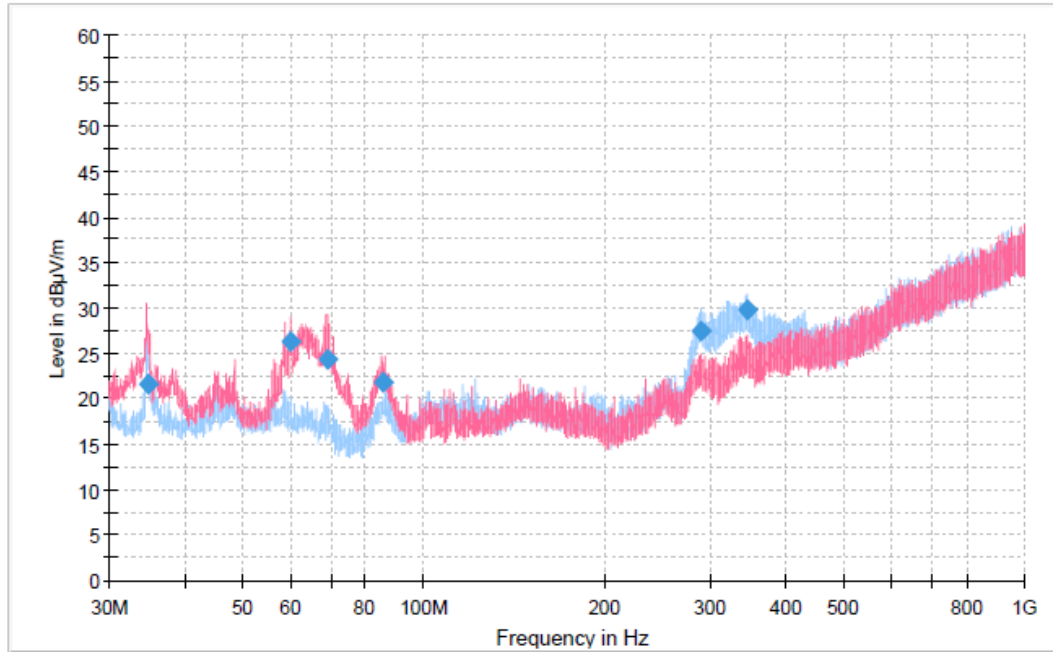
(9 kHz to 30 MHz_Y)



Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Corr. (dB/m)
0.010120	28.93	---	---	---	1000.0	0.200	H	35.0	-10.8
0.035167	46.57	---	---	---	1000.0	0.200	H	156.0	-12.7
0.069134	35.74	---	---	---	1000.0	0.200	H	13.0	-12.9
0.480195	38.97	---	---	---	1000.0	9.000	H	84.0	-12.9
0.480195	---	29.05	---	---	1000.0	9.000	H	84.0	-12.9
0.934175	36.79	---	---	---	1000.0	9.000	H	50.0	-12.8
0.934175	---	31.08	---	---	1000.0	9.000	H	50.0	-12.8

(9 kHz to 30 MHz_Z)

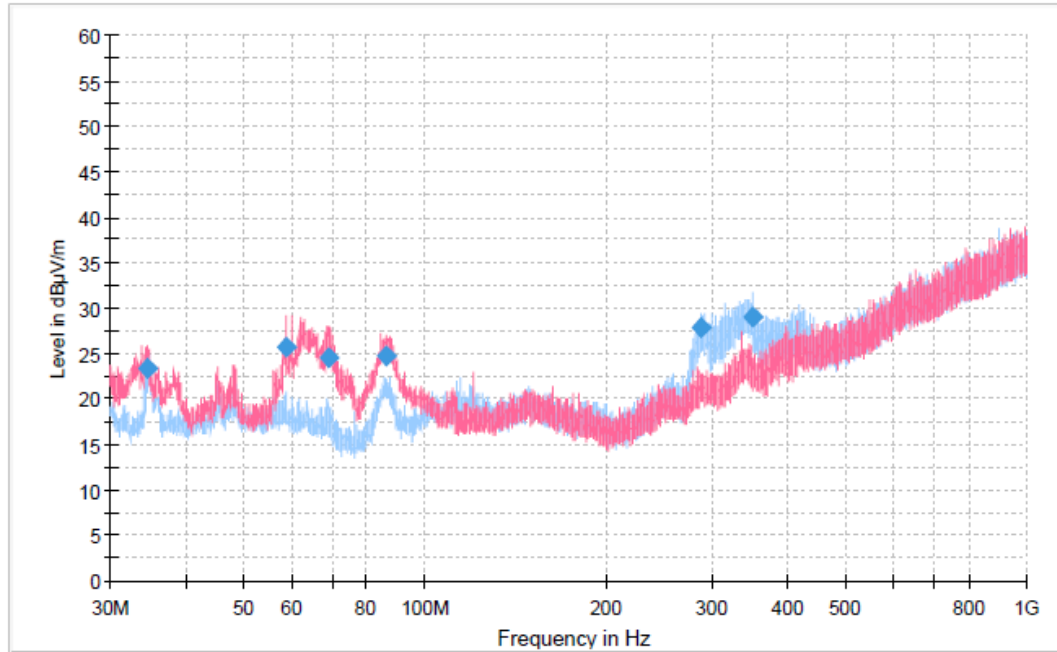


— Preview Result 1H-PK+ — Preview Result 1V-PK+ ◆ Final_Result QPK

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.716000	21.69	---	---	1000.0	120.000	125.0	V	69.0	13.3
60.025333	26.37	---	---	1000.0	120.000	311.0	V	107.0	13.8
69.021667	24.35	---	---	1000.0	120.000	120.0	V	303.0	12.5
85.310000	21.90	---	---	1000.0	120.000	282.0	V	97.0	10.0
288.639000	27.39	---	---	1000.0	120.000	120.0	H	84.0	17.1
346.628000	29.71	---	---	1000.0	120.000	100.0	H	285.0	18.7

(30 MHz to 1 000 MHz_X)

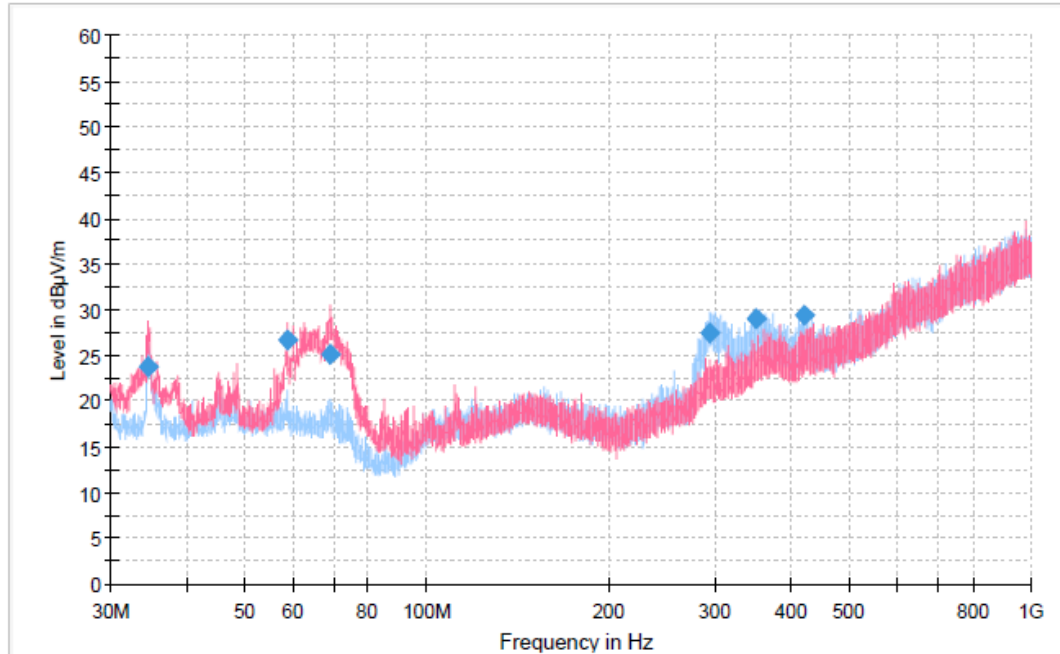


— Preview Result 1H-PK+ — Preview Result 1V-PK+ ◆ Final_Result QPK

Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.676000	23.28	---	---	1000.0	120.000	125.0	V	306.0	13.3
58.772000	25.78	---	---	1000.0	120.000	325.0	V	112.0	13.9
69.021667	24.50	---	---	1000.0	120.000	188.0	V	66.0	12.5
86.078333	24.81	---	---	1000.0	120.000	120.0	V	305.0	10.0
287.733667	27.88	---	---	1000.0	120.000	119.0	H	67.0	17.1
349.975333	29.05	---	---	1000.0	120.000	106.0	H	296.0	18.8

(30 MHz to 1 000 MHz_Y)



— Preview Result 1H-PK+ — Preview Result 1V-PK+ ◆ Final_Result QPK

Final Result

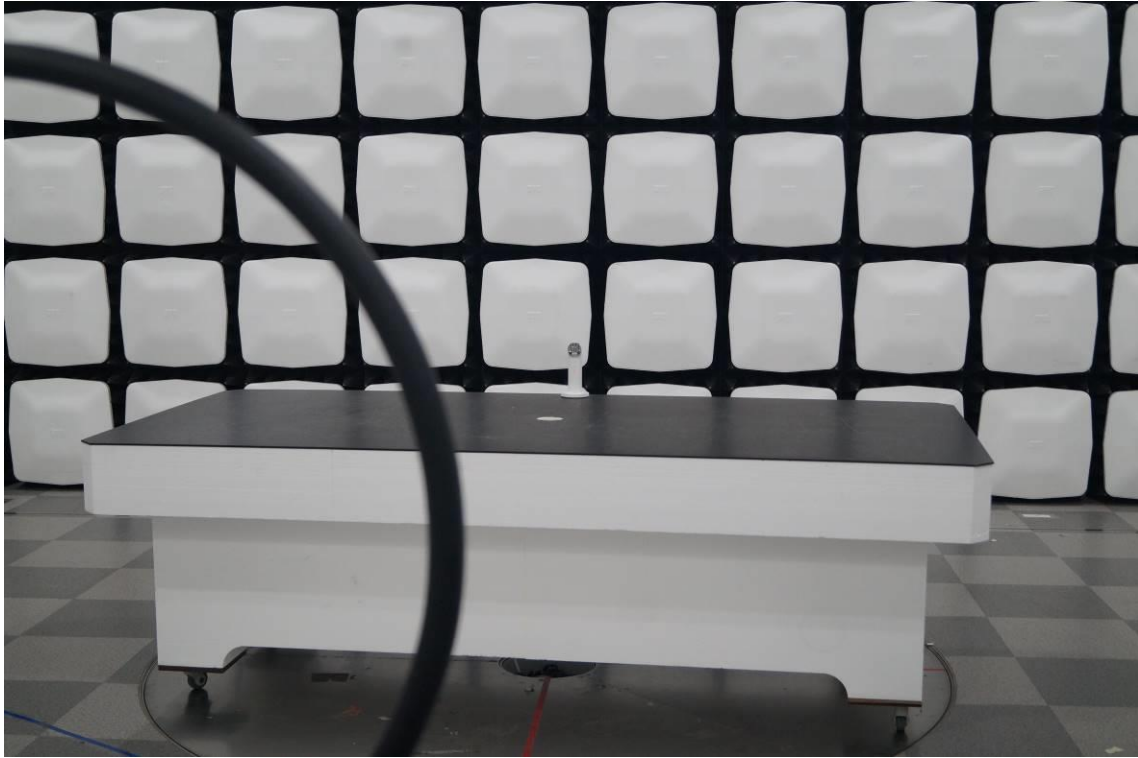
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.586667	23.78	---	---	1000.0	120.000	106.0	V	138.0	13.3
58.739667	26.62	---	---	1000.0	120.000	295.0	V	0.0	13.9
69.071000	25.17	---	---	1000.0	120.000	182.0	V	40.0	12.5
293.076333	27.54	---	---	1000.0	120.000	110.0	H	5.0	17.3
350.702000	28.97	---	---	1000.0	120.000	100.0	H	201.0	18.8
422.402000	29.45	---	---	1000.0	120.000	100.0	H	183.0	21.4

(30 MHz to 1 000 MHz_Z)

- The end -



APPENDIX A
: TEST SET UP PHOTOGRAPHS



EUT Type: RE-Merge
Model Name: RHS-B500