

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-21N-RWD-067

Reception No. : 2111004818

Applicant : Samsung Electronics Co., Ltd.

Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, United States, 07058

Manufacturer : Samsung Electronics Co., Ltd.

Address : Yen Phong 1 Industrial park, Yen Phong District Bac Ninh Province, VIETNAM

Type of Equipment : WIRELESS CHARGER

FCC ID. : A3LEPP2400

Model Name : EP-P2400

Multiple Model Name : N/A

Serial number : RF7RC6V00S1HMB

Total page of Report : 14 pages (including this page)

Date of Incoming : November 16, 2021

Date of issue : November 30, 2021

SUMMARY

The equipment complies with the regulation; **FCC CFR 47 PART 1.1310**

This test report only contains the result of a single test of the sample supplied for the examination.

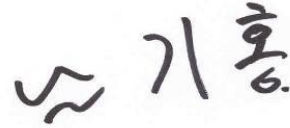
It is not a generally valid assessment of the features of the respective products of the mass-production.



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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-21N-RWD-067	November 30, 2021	Initial Release	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : Samsung Electronics Co., Ltd.
 ADDRESS : 19 Chapin Rd., Building D, Pine Brook, New Jersey, United States, 07058
 CONTACT PERSON : Jenni, Chun / General Manager
 TELEPHONE NO : +973-808-6375
 FCC ID : A3LEPP2400
 MODEL NAME : EP-P2400
 BRAND NAME : -
 SERIAL NUMBER : RF7RC6V00S1HMB
 DATE : November 30, 2021

EQUIPMENT CLASS	DCD – Part 15 Low Power Transmitter Below 1 705 kHz
KIND OF EQUIPMENT	WIRELESS CHARGER
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2020
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC&IC RULES PART(S)	FCC CFR 47 PART 1.1310
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. The equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The Samsung Electronics Co., Ltd., Model: EP-P2400 (referred to as the EUT in this report) is an WIRELESS CHARGER. Product specification information described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	WIRELESS CHARGER
OPERATING FREQUENCY	119.0 kHz ~ 122 kHz, 126.2 kHz ~ 129.2 kHz
RATED RF OUTPUT POWER	74.7 dB μ V/m
ANTENNA TYPE	Coil Antenna
MODULATION	ASK
RATED SUPPLY VOLTAGE	DC 9.0 V

2.2 Accessories Description

DEVICE	MODEL	MANUFACTURER	SERIAL	SETTING SPECIFICATION	
				WATT	FREQUENCY
Mobile 1 (Galaxy S21)	SM-G991U	SAMSUNG	R3CNA03H82J	4.5W / 7.5W / 15W	127.7 kHz
Mobile 2 (Galaxy Note 10)	SM-N970U	SAMSUNG	R38M60EDYJT	4.5W	120.5 kHz
Earphones (Earbuds)	SM-R190	SAMSUNG	RF2R10C8P1X	2W	127.7 kHz
Watches (Galaxy Watch 4)	SM-R860	SAMSUNG	R3AR404F1TB	2W	146 kHz

2.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set as following condition.

Mode	Operating Frequency	Tx. Frequency	Set. Watt	Acc.
Mode 1 (idle)	126.2 kHz ~ 129.2 kHz	127.7 kHz	N/A	None
Mode 2 (Mobile 4.5 W)	126.2 kHz ~ 129.2 kHz	127.7 kHz	4.5 Watt	Mobile 1 (Galaxy S21)
Mode 3 (Mobile 7.5 W)	126.2 kHz ~ 129.2 kHz	127.7 kHz	7.5 W	Mobile 1 (Galaxy S21)
Mode 4 (Mobile 15 W)	126.2 kHz ~ 129.2 kHz	127.7 kHz	15 W	Mobile 1 (Galaxy S21)
Mode 5 (Specific Mobile 4.5 W)	119.0 kHz ~ 122.0 kHz	120.5 kHz	4.5 W	Mobile 2 (Galaxy Note 10)
Mode 6 (Earphone 2 W)	126.2 kHz ~ 129.2 kHz	127.7 kHz	2 W	Earphones (Earbuds)

for DC 9.0 V.

2.4 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. RADIO FREQUENCY EXPOSURE

4.1 Environmental evaluation and exposure limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of this chapter

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Average Time [minutes]
(A) Limits for Occupational / Control Exposures				
0.3 – 3.0	614	1.63	*(100)	6
3.0 – 30	1 842/f	4.89/f	*(900/f ²)	6
30 – 300	61.4	0.163	1.0	6
300 – 1 500			f/300	6
1 500 – 100 000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	*(100)	30
3.0 – 30	824/f	2.19/f	*(180/f ²)	30
30 – 300	27.5	0.073	0.2	30
300 – 1 500			f/1 500	30
1 500 – 100 000			1.0	30

f = frequency in MHz

* = Plane wave equivalent power density

Note 1 to Table 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2 to Table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The EUT does meet the requirement of section 5. b) of KDB 680106 D01 RF Exposure Wireless Charging Apps v03

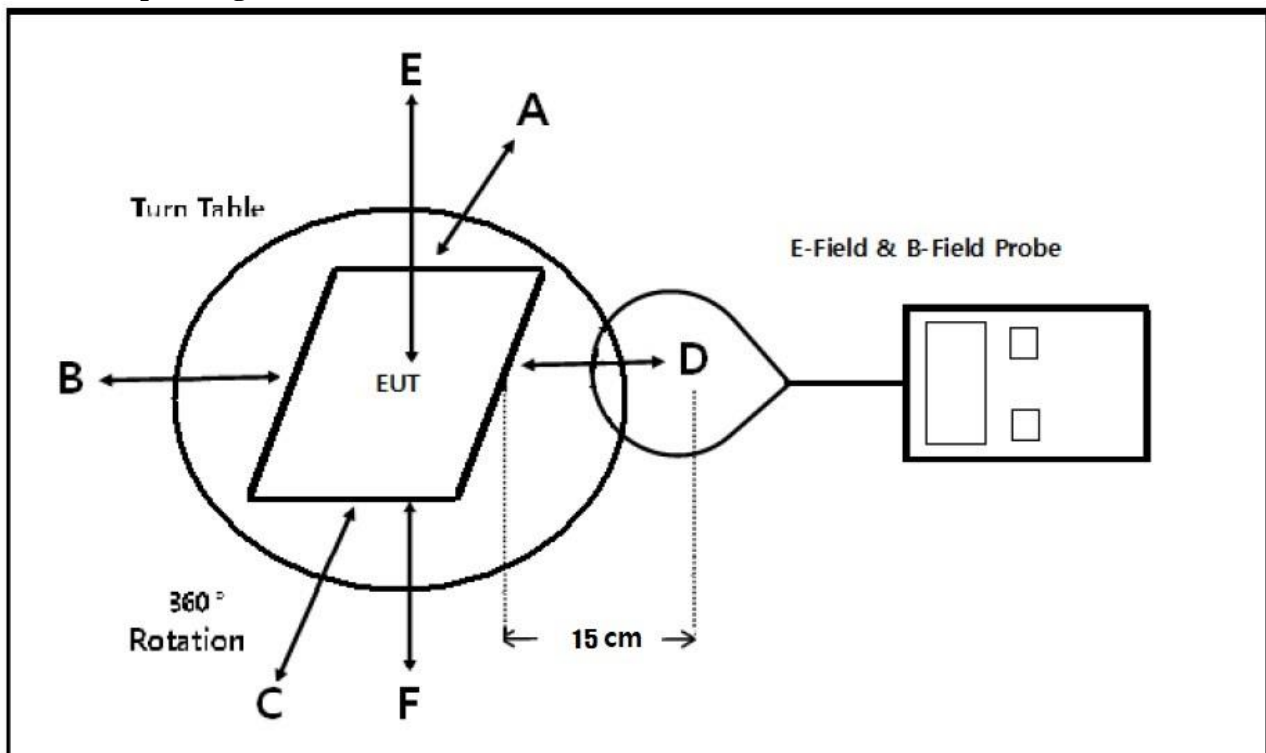
Conditions requirement	Answers
Power transfer frequency is less than 1MHz	After measuring the product the transfer frequency is 110-205 kHz
Output power from each primary coil is less than 15 watts	After measuring the product the each primary coil power is 15 watts
The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.	The transfer system includes single primary
Client devices is inserted in or placed directly in contact with the transmitter.	Client device is placed directly in contact with the transmitter
Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Mobile exposure conditions only
The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	After measuring the product the Max H-field Strength is 0.213 A/m Far less than 50% of the MPE limit.

4.2 H / E field strength

4.2.1 EUT Operating condition

Mode	Test Mode	Description
Charging Mode With load	Power <10% charging	Using Max. load
	Power 50 ~ 55% charging	Using Mid. load
	Power 90 ~ 95% charging	Using Min. load

4.2.2 EUT Operating condition



4.2.3 Measurement procedure

- 1) The RF exposure test was performed in anechoic chamber.
- 2) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface.
- 3) The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E, F) were completed.
- 4) The EUT was measured according to the dictates of KDB 680106 D01 v03.

Remark: The EUT's test position A, B, C, D, E and F is valid for the E and H field measurements.

4.2.4 Test data for Mode 2 (Frequency : 127.7 kHz / Accessories : Mobile 1)

Mode	Field strength	Position A	Position B	Position C	Position D	Position E	Position F	50% Limits [V/m]	Limits [V/m]
Max. load	uT	0.407	0.411	0.500	0.469	0.488	0.488	-	-
	A/m	0.324	0.327	0.398	0.373	0.389	0.389	0.815	1.630
	V/m	121.79	122.99	149.62	140.34	146.03	146.03	307.00	614.00
Mid. load	uT	0.453	0.463	0.427	0.435	0.503	0.488	-	-
	A/m	0.361	0.369	0.340	0.346	0.400	0.389	0.815	1.630
	V/m	135.55	138.55	127.77	130.17	150.51	146.03	307.00	614.00
Min. load	uT	0.443	0.475	0.444	0.415	0.523	0.465	-	-
	A/m	0.353	0.378	0.354	0.330	0.416	0.370	0.815	1.630
	V/m	132.56	142.14	132.86	124.18	156.50	139.14	307.00	614.00

※ Note. Calculation

$$V/m = 10^{((dBuV/m)-120)/20} = 10^{((dBuA/m+51.5)-120)/20} = 10^{((20lg(A/m*10^6)+51.5)-120)/20}$$

$$A/m = uT/1.25$$

4.2.5 Test data for Mode 3 (Frequency : 127.7 kHz / Accessories : Mobile 1)

Mode	Field strength	Position A	Position B	Position C	Position D	Position E	Position F	50% Limits [V/m]	Limits [V/m]
Max. load	uT	0.471	0.487	0.411	0.477	0.458	0.501	-	-
	A/m	0.375	0.388	0.327	0.380	0.365	0.399	0.815	1.630
	V/m	140.94	145.73	122.99	142.73	137.05	149.92	307.00	614.00
Mid. load	uT	0.508	0.488	0.437	0.468	0.486	0.500	-	-
	A/m	0.404	0.389	0.348	0.373	0.387	0.398	0.815	1.630
	V/m	152.01	146.03	130.77	140.04	145.43	149.62	307.00	614.00
Min. load	uT	0.505	0.463	0.429	0.446	0.449	0.438	-	-
	A/m	0.402	0.369	0.342	0.355	0.357	0.349	0.815	1.630
	V/m	151.11	138.55	128.37	133.46	134.36	131.06	307.00	614.00

※ Note. Calculation

$$V/m = 10^{((dBuV/m)-120)/20} = 10^{((dBuA/m+51.5)-120)/20} = 10^{((20lg(A/m*10^6)+51.5)-120)/20}$$

$$A/m = uT/1.25$$

4.2.7 Test data for Mode 4 (Frequency : 127.7 kHz / Accessories : Mobile 1)

Mode	Field strength	Position A	Position B	Position C	Position D	Position E	Position F	50% Limits [V/m]	Limits [V/m]
Max. load	uT	0.403	0.461	0.478	0.444	0.419	0.499	-	-
	A/m	0.321	0.367	0.381	0.354	0.334	0.397	0.815	1.630
	V/m	120.59	137.95	143.03	132.86	125.38	149.32	307.00	614.00
Mid. load	uT	0.501	0.499	0.451	0.403	0.478	0.503	-	-
	A/m	0.399	0.397	0.359	0.321	0.381	0.400	0.815	1.630
	V/m	149.92	149.32	134.95	120.59	143.03	150.51	307.00	614.00
Min. load	uT	0.479	0.484	0.447	0.502	0.494	0.493	-	-
	A/m	0.381	0.385	0.356	0.400	0.393	0.393	0.815	1.630
	V/m	143.33	144.83	133.76	150.22	147.82	147.52	307.00	614.00

※ Note. Calculation

$$V/m = 10^{(((dBuV/m)-120)/20)} = 10^{(((dBuA/m+51.5)-120)/20)} = 10^{(((20lg(A/m*10^6)+51.5)-120)/20)}$$

$$A/m = uT/1.25$$

4.2.8 Test data for Mode 5 (Frequency : 120.5 kHz / Accessories : Mobile 2)

Mode	Field strength	Position A	Position B	Position C	Position D	Position E	Position F	50% Limits [V/m]	Limits [V/m]
Max. load	uT	0.428	0.450	0.463	0.460	0.460	0.478	-	-
	A/m	0.341	0.358	0.369	0.366	0.366	0.381	0.815	1.630
	V/m	128.07	134.66	138.55	137.65	137.65	143.03	307.00	614.00
Mid. load	uT	0.477	0.501	0.478	0.500	0.488	0.460	-	-
	A/m	0.380	0.399	0.381	0.398	0.389	0.366	0.815	1.630
	V/m	142.73	149.92	143.03	149.62	146.03	137.65	307.00	614.00
Min. load	uT	0.423	0.443	0.465	0.438	0.418	0.458	-	-
	A/m	0.337	0.353	0.370	0.349	0.333	0.365	0.815	1.630
	V/m	126.58	132.56	139.14	131.06	125.08	137.05	307.00	614.00

※ Note. Calculation

$$V/m = 10^{(((dBuV/m)-120)/20)} = 10^{(((dBuA/m+51.5)-120)/20)} = 10^{(((20lg(A/m*10^6)+51.5)-120)/20)}$$

$$A/m = uT/1.25$$

4.2.9 Test data for Mode 6 (Frequency : 127.7 kHz / Accessories : Earphone)

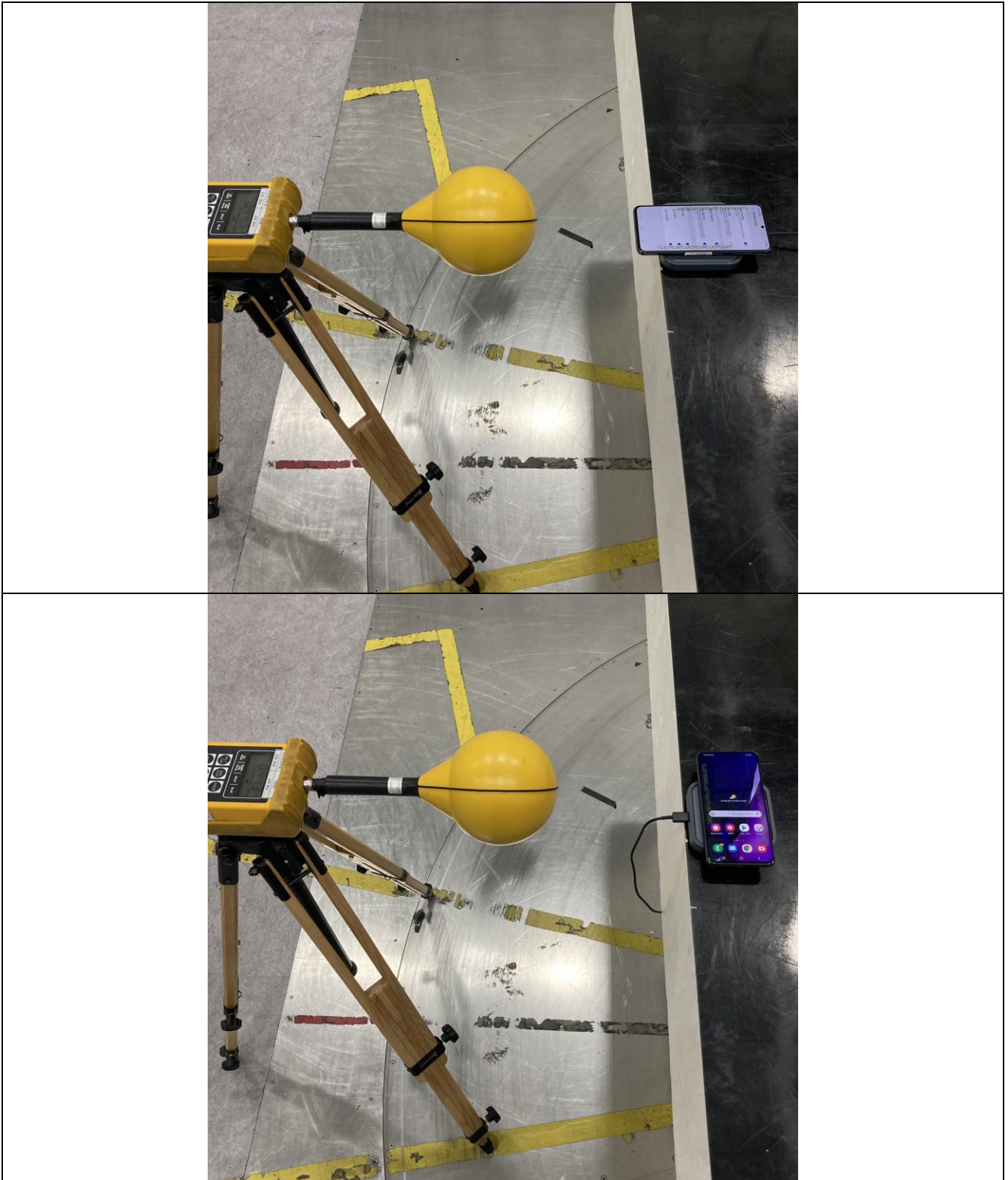
Mode	Field strength	Position A	Position B	Position C	Position D	Position E	Position F	50% Limits [V/m]	Limits [V/m]
Max. load	uT	0.431	0.403	0.443	0.441	0.467	0.488	-	-
	A/m	0.343	0.321	0.353	0.351	0.372	0.389	0.815	1.630
	V/m	128.97	120.59	132.56	131.96	139.74	146.03	307.00	614.00
Mid. load	uT	0.444	0.451	0.478	0.501	0.488	0.479	-	-
	A/m	0.354	0.359	0.381	0.399	0.389	0.381	0.815	1.630
	V/m	132.86	134.95	143.03	149.92	146.03	143.33	307.00	614.00
Min. load	uT	0.451	0.399	0.410	0.445	0.509	0.479	-	-
	A/m	0.359	0.318	0.326	0.354	0.405	0.381	0.815	1.630
	V/m	134.95	119.39	122.69	133.16	152.31	143.33	307.00	614.00

※ Note. Calculation

$$V/m = 10^{(((dBuV/m)-120)/20)} = 10^{(((dBuA/m+51.5)-120)/20)} = 10^{(((20lg(A/m*10^6)+51.5)-120)/20)}$$

$$A/m = uT/1.25$$

5. TEST PHOTO



6. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
ELT-400	NARDA	Exposure Level Meter	G-0032	Apr. 14, 2021 (1Y)