

TEST REPORT

FCC Part 15C

Equipment under test Wireless Phone Charger

Model name D7F76-AC000

FCC ID TQ8-D7F76AC000

Applicant Hyundai Mobis Co., Ltd.

Manufacturer DONGYANG E&P Inc.

Date of test(s) 2019.10.07~2019.10.17



Date of issue 2019.10.17

Issued to

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Revision history

Revision	Date of issue	Test report No.	Description
-	2019.10.17	KES-RF-19T0154	Initial

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1. General information

Applicant Hyundai Mobis Co., Ltd.
 Applicant address 203, Teheran-Ro, Gangnam-Gu, Seoul, 135-977, Korea
 Test site KES Co., Ltd.
 Test site address 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
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 Test Facility FCC Accreditation Designation No.: KR0100, Registration No.: 444148
 FCC rule part(s): Part 15C
 FCC ID: TQ8-D7F76AC000
 Test device serial No. Production Pre-production Engineering

1.1. EUT description

Equipment under test Wireless Phone Charger
 Frequency 0.110 MHz ~ 0.205 MHz
 Modulation type AM
 Model: D7F76-AC000
 Antenna specification Internal type(Coil antenna)
 Power source DC 12V

1.2. Test configuration

The **Hyundai Mobis Co.,Ltd. Wireless Phone Charger FCC ID: TQ8-D7F76AC000** was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15C
 ANSI C63.10-2013

1.3. Test frequency

		Frequency Range
Power source	DC 12 V	0.110 MHz ~ 0.205 MHz

1.4. Test mode

Mode	Description
Charging mode With Client device	100% full charging of Battery.
	Less than 50% of Battery
	Less than 1% of Battery

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1.5. Information about derivative model

N/A

1.6. Device modifications

N/A

1.7. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

1.8. Measurement Uncertainty

Test Item	Uncertainty	
Uncertainty for Conduction emission test	2.62 dB	
Uncertainty for Radiation emission test (include Fundamental emission)	9kHz - 30MHz	4.54 dB
	30MHz - 1GHz	4.36 dB
	Above 1GHz	5.00 dB

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

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2. Summary of tests

FCC Part Sections	Parameter	Test results
15.209	Radiated spurious emission	Pass
-	20dB Bandwidth	Pass

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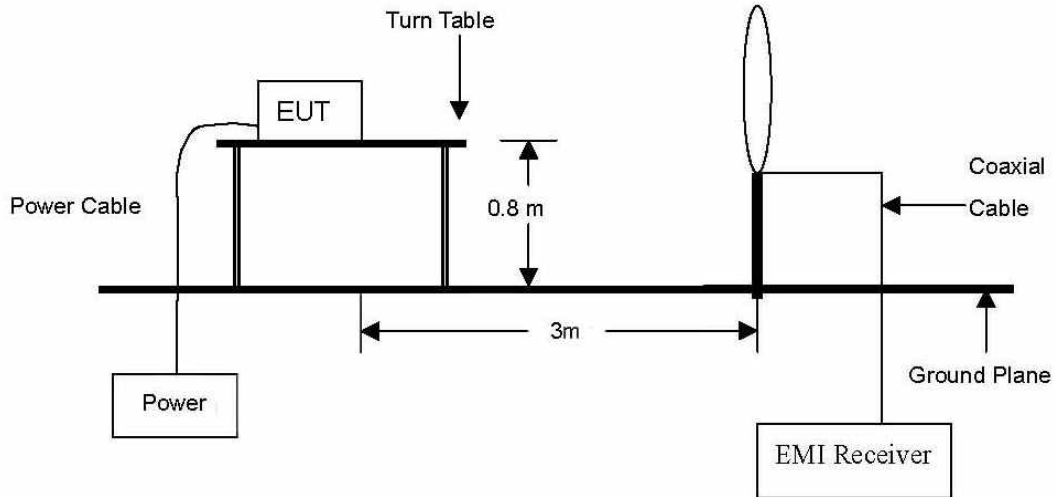
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3. Test results

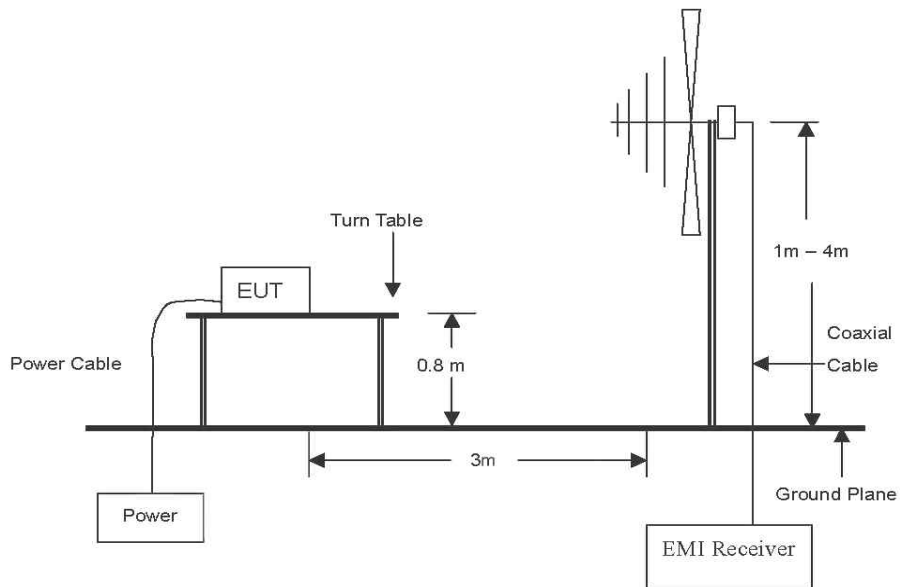
3.1. Radiated spurious emission

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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Test procedure

[9 kHz to 30 MHz]

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel, ground parallel and perpendicular of the antenna are set to make the measurement. It was determined that **parallel** was worst-case orientation; therefore, all final radiated testing was performed with the EUT in **parallel**.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 Hz / 300 Hz for peak detection (PK) at frequency below 9 kHz~ 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 kHz / 10 kHz for peak detection (PK) at frequency below 150 kHz~ 30 MHz.
3. For the frequency bands 9~ 90 kHz, 110~490 kHz the radiated emission limits are based on measurements employing an average detector.

[30 MHz to 1 GHz]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.

Note:

1. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. Measurement distance : 3 m.
3. Field strength = Level + Correction factor + F_d
4. $F_d = 40\log(D_m / D_s)$

Where:

 F_d = Distance factor in dB D_m = Measurement distance in meters D_s = Specification distance in metersFor 300m: $40\log(300/3) = 80$ dB for frequency band 0.009 MHz to 0.490 MHzFor 30m: $40\log(30/3) = 40$ dB for frequency band 0.490 MHz to 30 MHz

5. No significant emissions were found in the 90 - 110kHz restricted band.

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Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated ($\mu V/m$)
0.009 ~ 0.490	300	2400 / F(kHz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

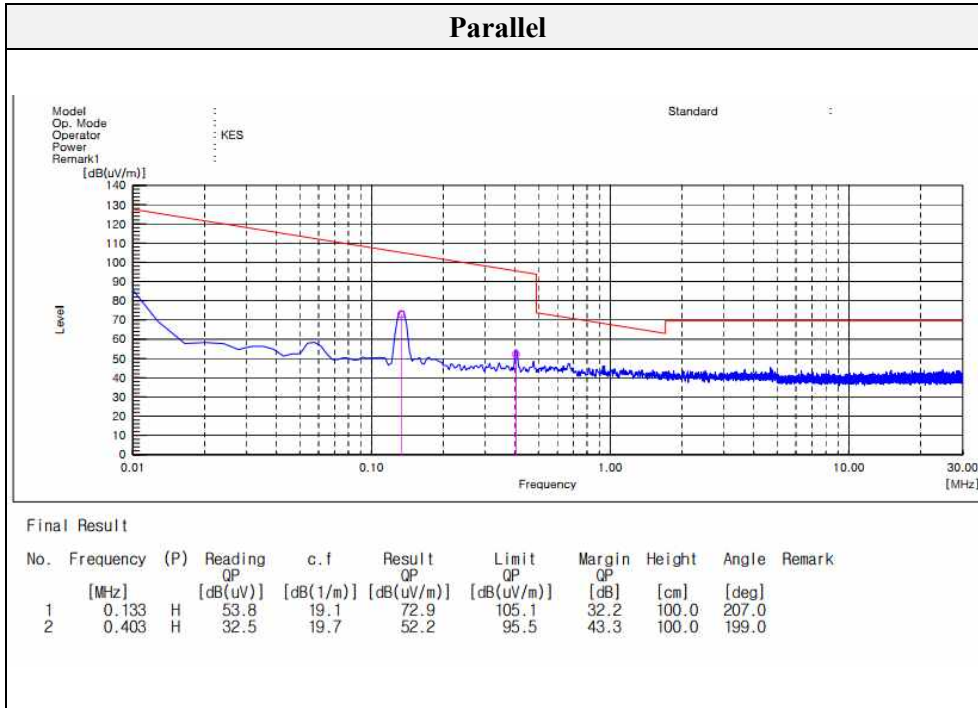
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Test results (Below 30 MHz)

Mode: 15W // 1 % charger

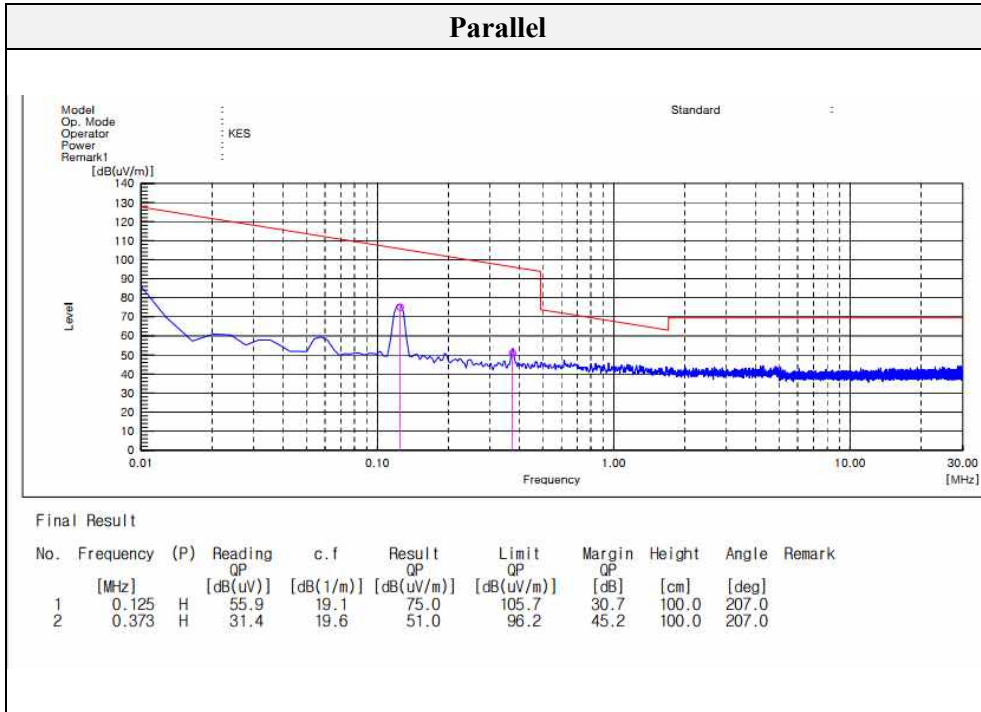
Distance of measurement: 3 meter



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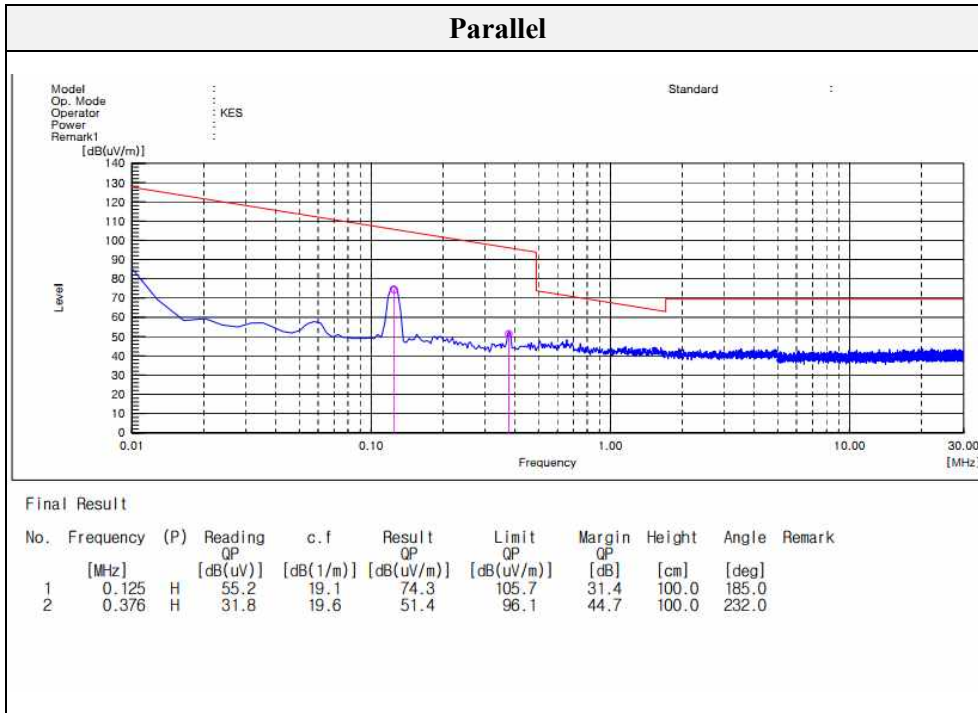
Mode: 15W // 50 % charge
 Distance of measurement: 3 meter



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Mode: 15W // 100 % charge
 Distance of measurement: 3 meter



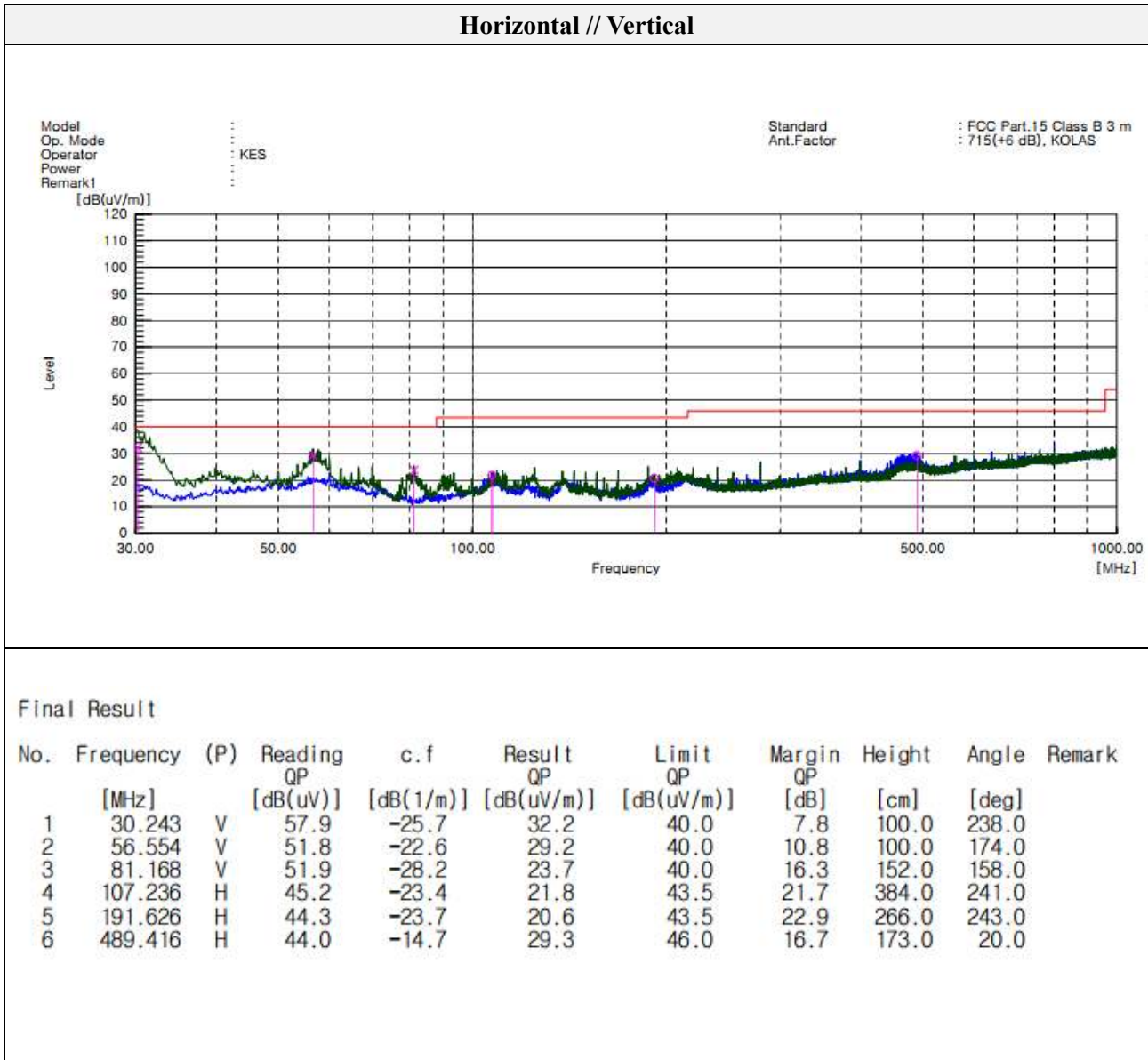
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Test results (Below 1 000 MHz)

Mode: 15W // 50 % charge (Worst Case)

Distance of measurement: 3 meter

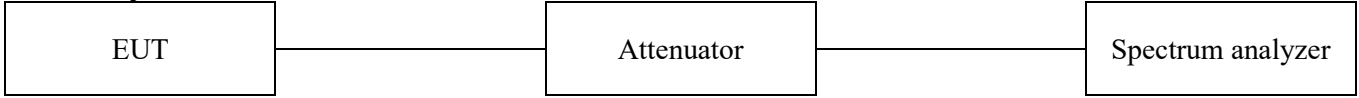


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3.2. 20dB Bandwidth

Test setup



Test procedures

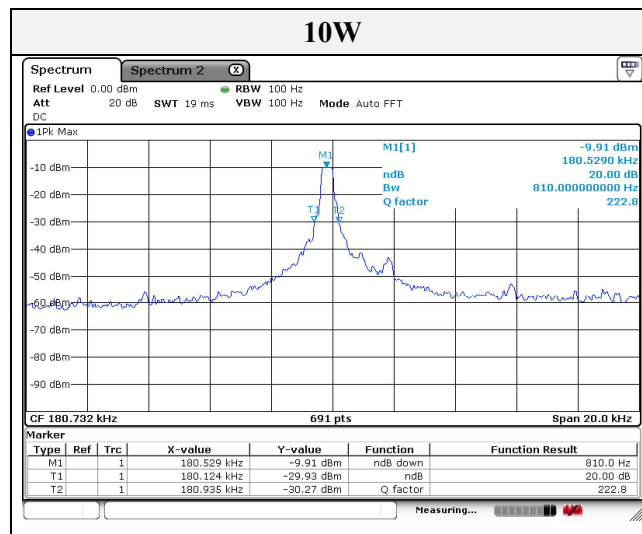
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the emission bandwidth. The VBW is set to $\geq RBW$. The sweep time is coupled.

Limit

None; for reporting purposes only.

Test results

Power source(W)	Frequency(MHz)	Measured bandwidth(kHz)
15	0.180 732	0.810



Note.

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.



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Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101002	1 year	2020.06.24
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2021.02.15
Trilog-broadband antenna	SCHWARZBECK	VULB 9163	714	2 years	2020.11.26
Amplifier	R&S	SCU 01	100603	1 year	2019.11.26
Preamplifier	AGILENT	8449B	3008A01742	1 year	2020.01.08
EMI Test Receiver	R&S	ESU26	100551	1 year	2020.04.09

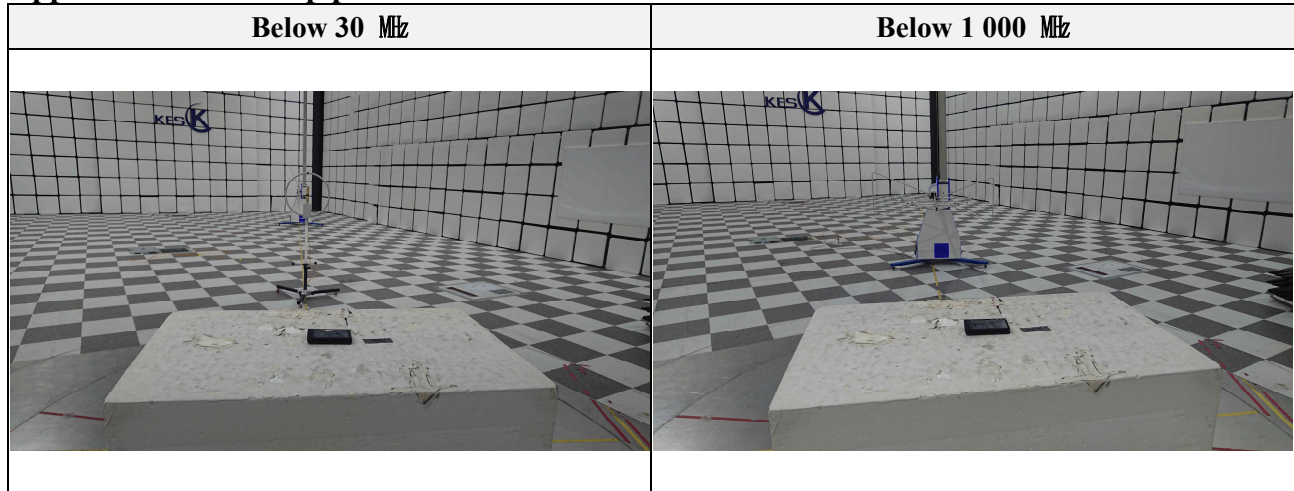
Peripheral device

Device	Manufacturer	Model No.	Note
Client device	Samsung	SM-N950N	Mobile Phone

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Appendix B. Test setup photo



The end of test report.

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