

NCC TEST REPORT

Equipment : Charging Case
Brand Name : URBANEARS
Model Name : Luma Charging Case
Applicant : 百滋國際股份有限公司
 台北市松山區寶清街 17 號 5 樓之 1
Manufacturer : Zound Industries International AB
 Room 411-412, 4th Floor, Main Building, No. 99 Qiao Cheng
 East Road, Nanshan District, Shenzhen City, China
Standard : LP0002 Section 2.8 (2018-01-10)

The product was received on Jun. 01, 2020, and testing was started from Jun. 03, 2020 and completed on Jun. 04, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

[illegible]

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	2.2	Antenna Requirement	PASS	-
3.1	2.3	AC Power-line Conducted Emissions	PASS	-
3.2	2.8	Transmitter Radiated Emissions	PASS	-
3.3	-	Emission Bandwidth	PASS	-
3.4	2.11	Receiver Radiated Emissions	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None.

Reviewed by: Sam Tsai

Report Producer: Yunha Liou

1 General Description

1.1 Information

1.1.1 General Information

Wireless Power Transfer General Information			
Frequency Range	Modulation Mode	Charging Freq. (kHz)	Field Strength (dBuV/m)
110-205 kHz	ASK	156.19	76.62
Power Transfer Method	Output power from each primary coil	That may have multiple primary coils	Charging Method
Magnetic induction and only single primary coil	<15W	No	Client directly contact
Note 1: Field strength performed peak level at 3m.			

1.1.2 Antenna Information

Antenna Category	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☐	Temporary RF connector provided
☒	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
☐	External antenna (dedicated antennas)

Antenna General Information				
No.	Brand Name	Model Name	Ant. Cat.	Ant. Type
1	COPO	CP2021	Integral	Wire

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From AC Adapter / Battery
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device)
	Combined Equipment - Brand Name / Model No.:
☐	Plug-in radio (EUT intended for a variety of host systems)
	Host System - Brand Name / Model No.:
☐	Other: The EUT place with the platform.

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
☒	Operated normally mode for worst duty cycle
☐	Operated test mode for worst duty cycle
Test Signal Duty Cycle (x)	
☒	100%

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ LP0002 Section 2.8 (2018-01-10)
- ♦ ANSI C63.10-2013
- ♦ ANSI C63.4-2014

The following reference test guidance is not within the scope of accreditation of TAF:

- ♦ KDB 680106 D01 RF Exposure Wireless Charging Apps v03
- ♦ KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location			
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
☐	Wen Shan	ADD : No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)	
		TEL : 886-3-318-0787	FAX : 886-3-318-0287

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH07-HY	Justin	19.6~24.0°C / 51~55%	03/Jun/2020
AC Conduction	CO04-HY	Edward	21.4~23.2°C / 57~62%	03/Jun/2020~ 04/Jun/2020
Radiated Emission	03CH02-HY	Daniel	20.7~25.8°C / 52~61%	03/Jun/2020

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	0.9 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.0 dB	Confidence levels of 95%
Temperature	0.41 °C	Confidence levels of 95%
Humidity	3.4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

Condition Item	Abbreviation/Remark	Remark
Tnom Vnom	Tnom	20°C
-	Vnom	110V

2.2 The Worst Case Configuration

Mode	Field Strength (dBuV/m at 3 m)	Charger Frequencies (kHz)	Power Setting
WPC	76.62	156.19	default

Note.1: Wireless charger were performed all charging conditions including variable loading and non-charging operation, the worst mode is full charging loading.

Note.2: Wireless charger frequencies are variable frequency range (110-205 kHz) and depend on charging loading.

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX/CRX
	☒ Adapter Mode

The Worst Case Mode for Following Conformance Tests	
Tests Item	Transmitter Radiated Emissions, Emission Bandwidth
Test Condition	Radiated measurement
Operating Mode	CTX/CRX
	☒ Adapter Mode
Orthogonal Planes of EUT	Z Plane
	

2.4 Accessories

Accessories				
USB Cable	Brand Name	URBANEARS	Model Name	USB-C charging cable
	Signal Line	0.15 meter, non-shielded cable, w/o ferrite core		
Battery	Brand Name	VDL	Model Name	532530
	Power Rating	3.7Vdc, 400mAh	Type	li-polymer

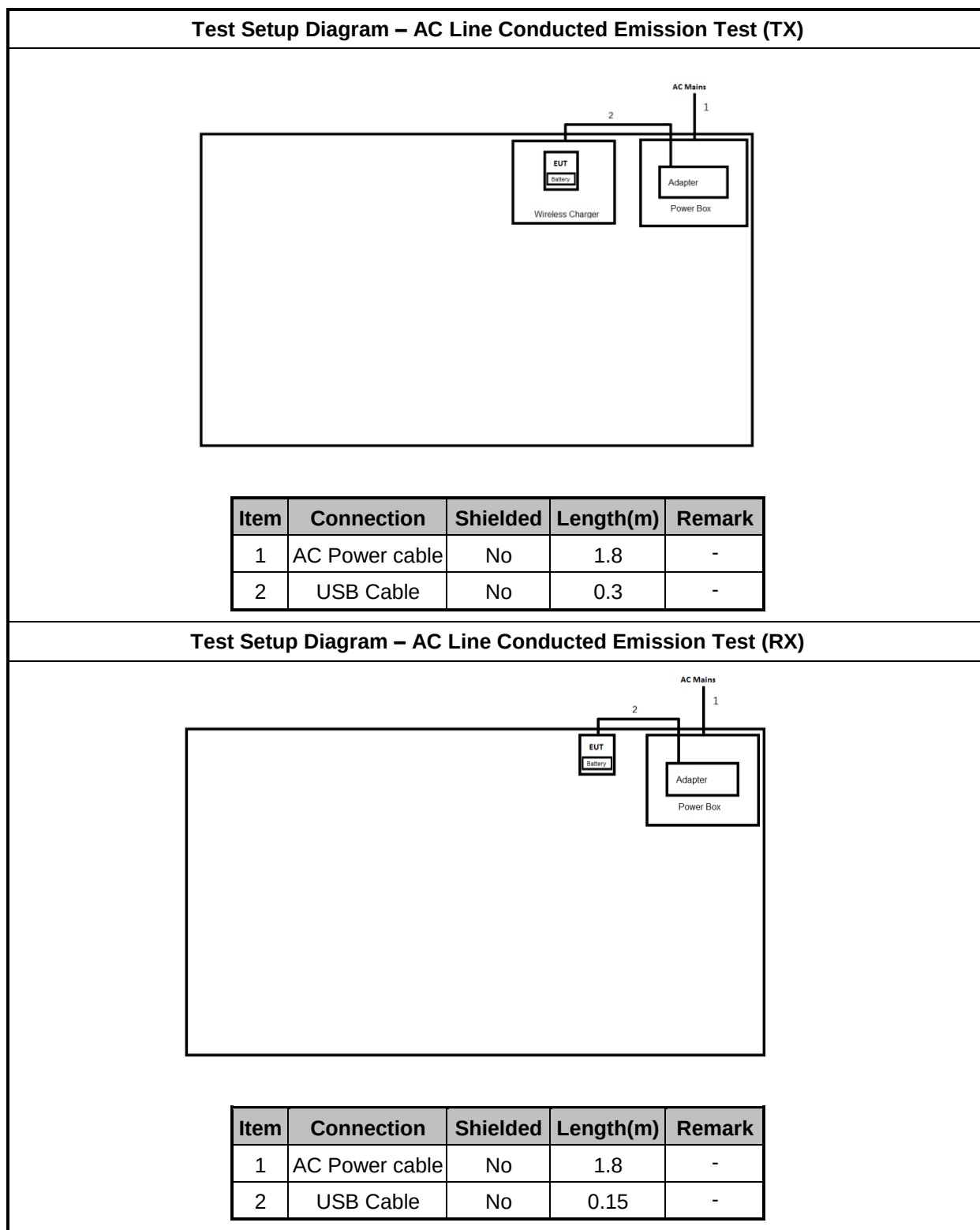
Reminder: Regarding to more detail and other information, please refer to user manual.

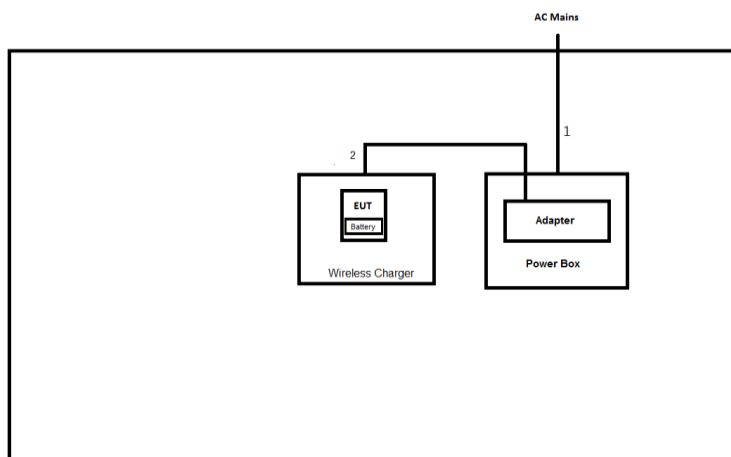
2.5 Support Equipment

Support Equipment – AC Conduction / Radiated					
No.	Equipment	Brand Name	Model Name	FCC ID	Remark
1	Wireless Charger	FASTCHARGE	FD-001	-	-
2	Adapter	Apple	A138S	-	-
3	USB Cable	FASTCHARGE	FD-002	-	-

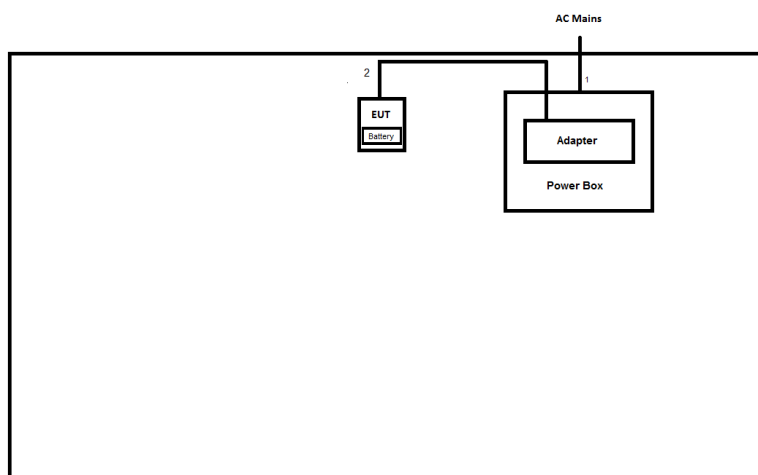
Support Equipment – Conducted					
1	Wireless Charger	FASTCHARGE	FD-001	DoC	-
2	USB Cable	Hawk	04-HTE120	DoC	-
3	AC Adapter	Apple	A138S	DoC	-

2.6 Test Setup Diagram



Test Setup Diagram - Radiated Test (TX)


Item	Connection	Shielded	Length(m)	Remark
1	AC Power cable	No	1.8	-
2	USB Cable	No	0.3	-

Test Setup Diagram - Radiated Test (RX)


Item	Connection	Shielded	Length(m)	Remark
1	AC Power cable	No	1.8	-
2	USB Cable	No	0.15	-

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

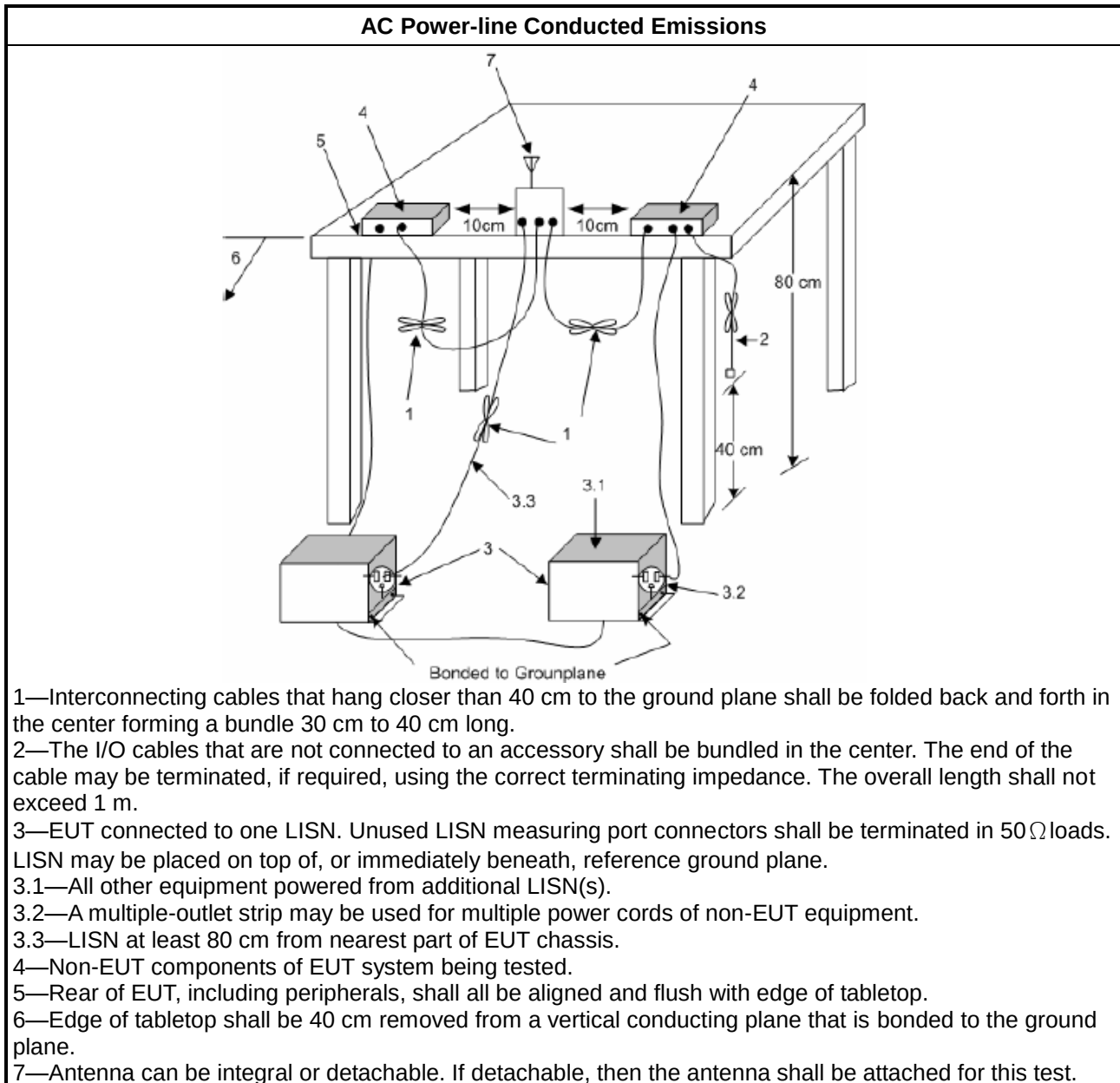
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

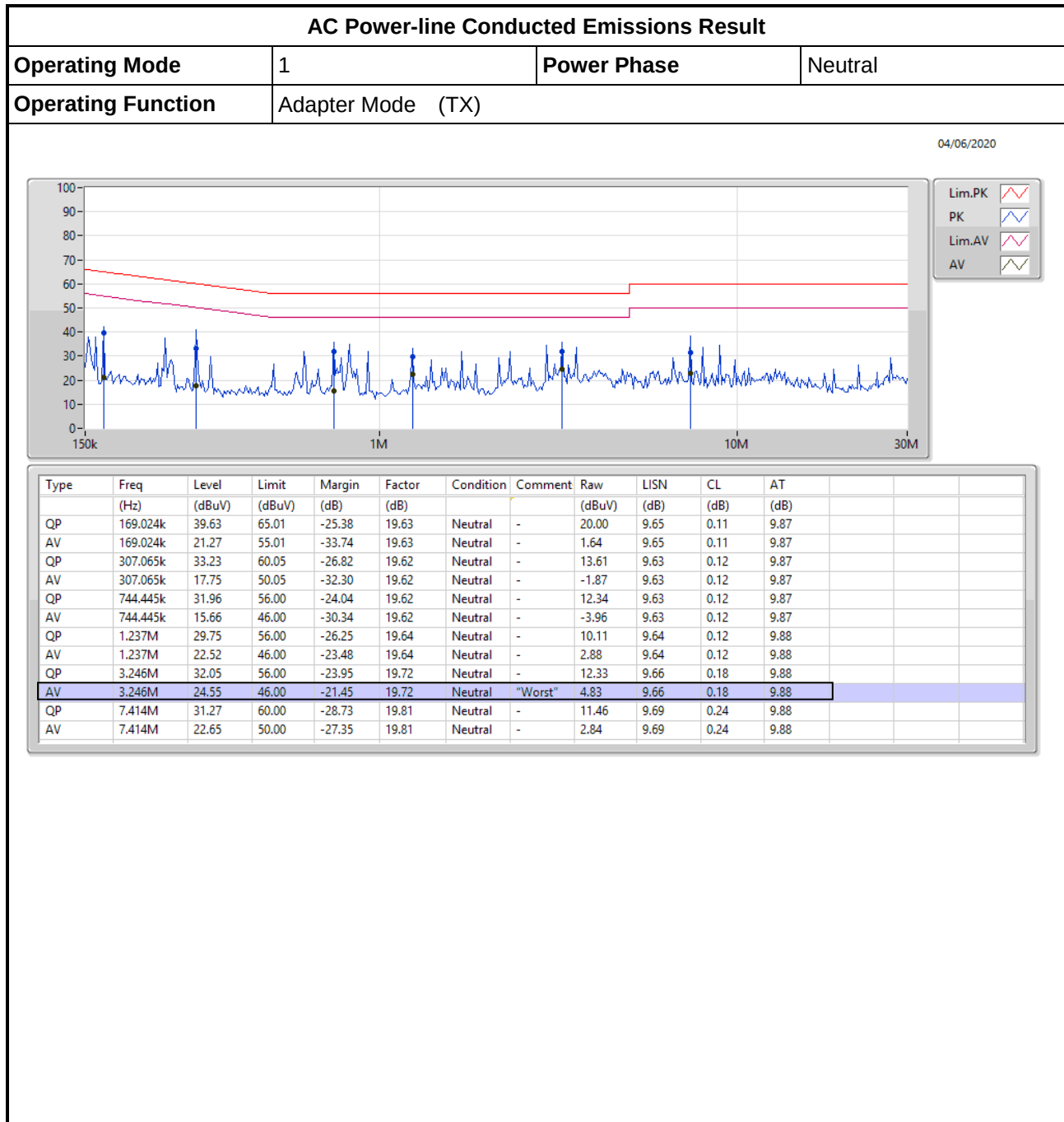
3.1.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.
☒	If AC conducted emissions fall in operating band, then following below test method confirm final result.
☐	Accept measurements done with a suitable dummy load replacing the antenna under the following conditions: (1) Perform the AC line conducted tests with the antenna connected to determine compliance with LP0002-2.3 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load to determine compliance with LP0002-2.3 limits within the transmitter's fundamental emission band.
☒	For a device with a permanent antenna operating at or below 30 MHz, accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) Perform the AC line conducted tests with the permanent antenna to determine compliance with the LP0002-2.3 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load in lieu of the permanent antenna to determine compliance with the LP0002-2.3 limits within the transmitter's fundamental emission band.

3.1.4 Test Setup



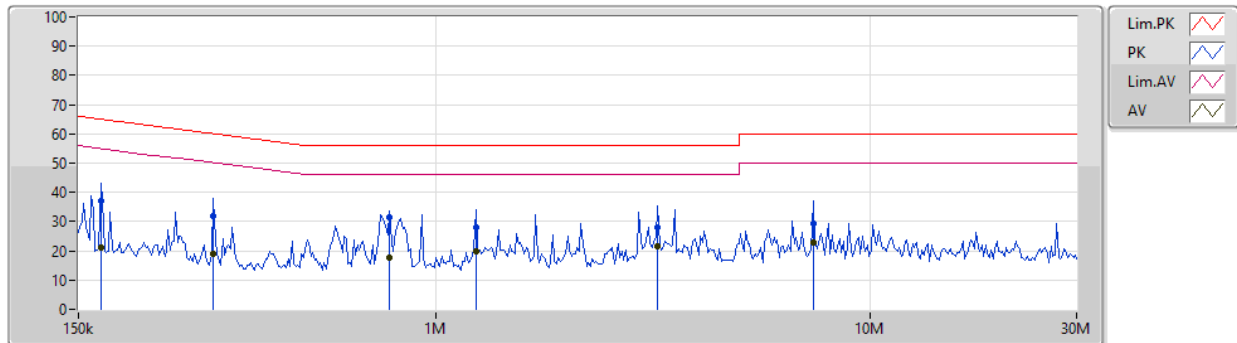
3.1.5 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	Adapter Mode (TX)		

04/06/2020

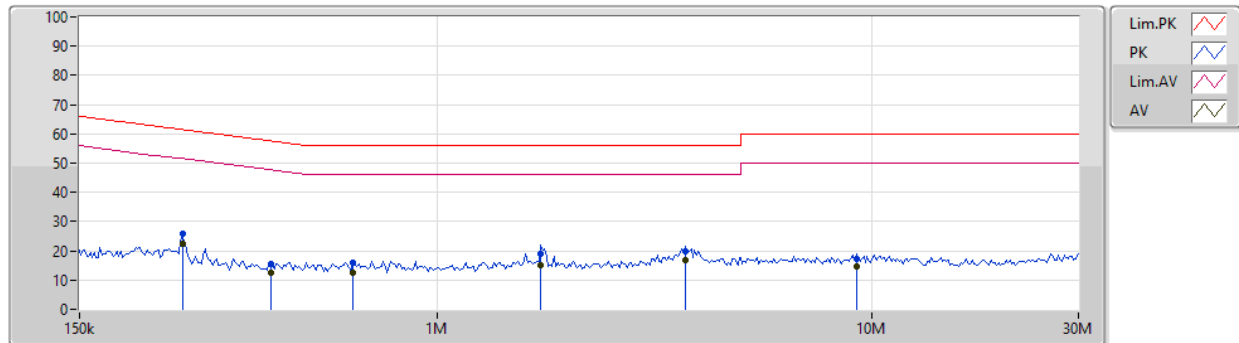


Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	169.024k	37.13	65.01	-27.88	19.64	Line	-	17.49	9.66	0.11	9.87			
AV	169.024k	21.13	55.01	-33.88	19.64	Line	-	1.49	9.66	0.11	9.87			
QP	307.065k	32.09	60.05	-27.96	19.63	Line	-	12.46	9.64	0.12	9.87			
AV	307.065k	18.84	50.05	-31.21	19.63	Line	-	-0.79	9.64	0.12	9.87			
QP	782.419k	31.35	56.00	-24.65	19.63	Line	"Worst"	11.72	9.64	0.12	9.87			
AV	782.419k	17.70	46.00	-28.30	19.63	Line	-	-1.93	9.64	0.12	9.87			
QP	1.237M	28.17	56.00	-27.83	19.64	Line	-	8.53	9.64	0.12	9.88			
AV	1.237M	19.86	46.00	-26.14	19.64	Line	-	0.22	9.64	0.12	9.88			
QP	3.246M	28.19	56.00	-27.81	19.72	Line	-	8.47	9.66	0.18	9.88			
AV	3.246M	21.34	46.00	-24.66	19.72	Line	-	1.62	9.66	0.18	9.88			
QP	7.414M	29.26	60.00	-30.74	19.80	Line	-	9.46	9.68	0.24	9.88			
AV	7.414M	22.85	50.00	-27.15	19.80	Line	-	3.05	9.68	0.24	9.88			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	Adapter Mode (RX)		

04/06/2020

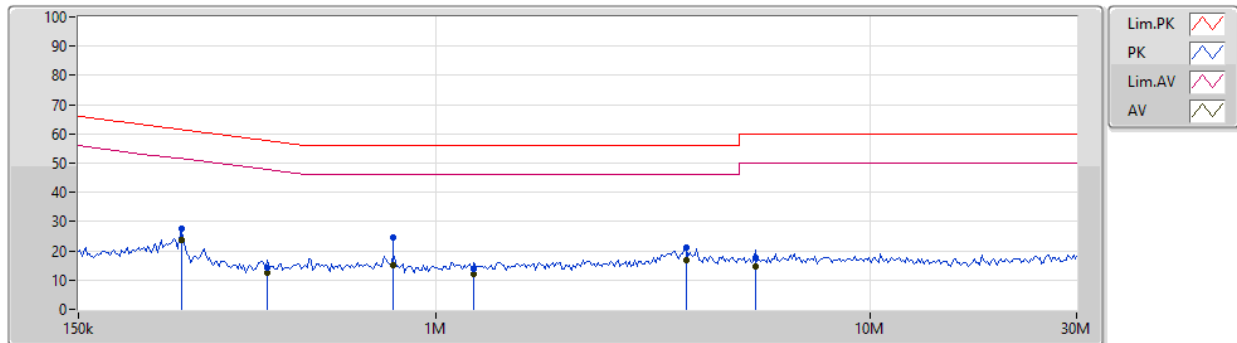


Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	259.279k	25.75	61.45	-35.70	19.63	Neutral	-	6.12	9.64	0.12	9.87			
AV	259.279k	22.25	51.45	-29.20	19.63	Neutral	"Worst"	2.62	9.64	0.12	9.87			
QP	413.877k	15.32	57.57	-42.25	19.63	Neutral	-	-4.31	9.63	0.13	9.87			
AV	413.877k	12.37	47.57	-35.20	19.63	Neutral	-	-7.26	9.63	0.13	9.87			
QP	641.227k	16.16	56.00	-39.84	19.62	Neutral	-	-3.46	9.63	0.12	9.87			
AV	641.227k	12.41	46.00	-33.59	19.62	Neutral	-	-7.21	9.63	0.12	9.87			
QP	1.734M	18.96	56.00	-37.04	19.66	Neutral	-	-0.70	9.65	0.14	9.87			
AV	1.734M	15.20	46.00	-30.80	19.66	Neutral	-	-4.46	9.65	0.14	9.87			
QP	3.732M	19.89	56.00	-36.11	19.72	Neutral	-	0.17	9.66	0.18	9.88			
AV	3.732M	16.62	46.00	-29.38	19.72	Neutral	-	-3.10	9.66	0.18	9.88			
QP	9.229M	17.17	60.00	-42.83	19.84	Neutral	-	-2.67	9.70	0.26	9.88			
AV	9.229M	14.71	50.00	-35.29	19.84	Neutral	-	-5.13	9.70	0.26	9.88			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	Adapter Mode (RX)		

04/06/2020



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	259.279k	27.56	61.45	-33.89	19.64	Line	-	7.92	9.65	0.12	9.87			
AV	259.279k	23.58	51.45	-27.87	19.64	Line	"Worst"	3.94	9.65	0.12	9.87			
QP	409.779k	14.34	57.64	-43.30	19.64	Line	-	-5.30	9.64	0.13	9.87			
AV	409.779k	12.42	47.64	-35.22	19.64	Line	-	-7.22	9.64	0.13	9.87			
QP	798.145k	24.75	56.00	-31.25	19.63	Line	-	5.12	9.64	0.12	9.87			
AV	798.145k	14.97	46.00	-31.03	19.63	Line	-	-4.66	9.64	0.12	9.87			
QP	1.224M	13.72	56.00	-42.28	19.64	Line	-	-5.92	9.64	0.12	9.88			
AV	1.224M	12.20	46.00	-33.80	19.64	Line	-	-7.44	9.64	0.12	9.88			
QP	3.769M	21.00	56.00	-35.00	19.72	Line	-	1.28	9.66	0.18	9.88			
AV	3.769M	16.79	46.00	-29.21	19.72	Line	-	-2.93	9.66	0.18	9.88			
QP	5.446M	17.47	60.00	-42.53	19.76	Line	-	-2.29	9.67	0.21	9.88			
AV	5.446M	14.79	50.00	-35.21	19.76	Line	-	-4.97	9.67	0.21	9.88			

3.2 Transmitter Radiated Emissions

3.2.1 Transmitter Radiated Emissions Limit

Transmitter Radiated Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: the frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 1GHz measurements employing a CISPR quasi-peak detector.

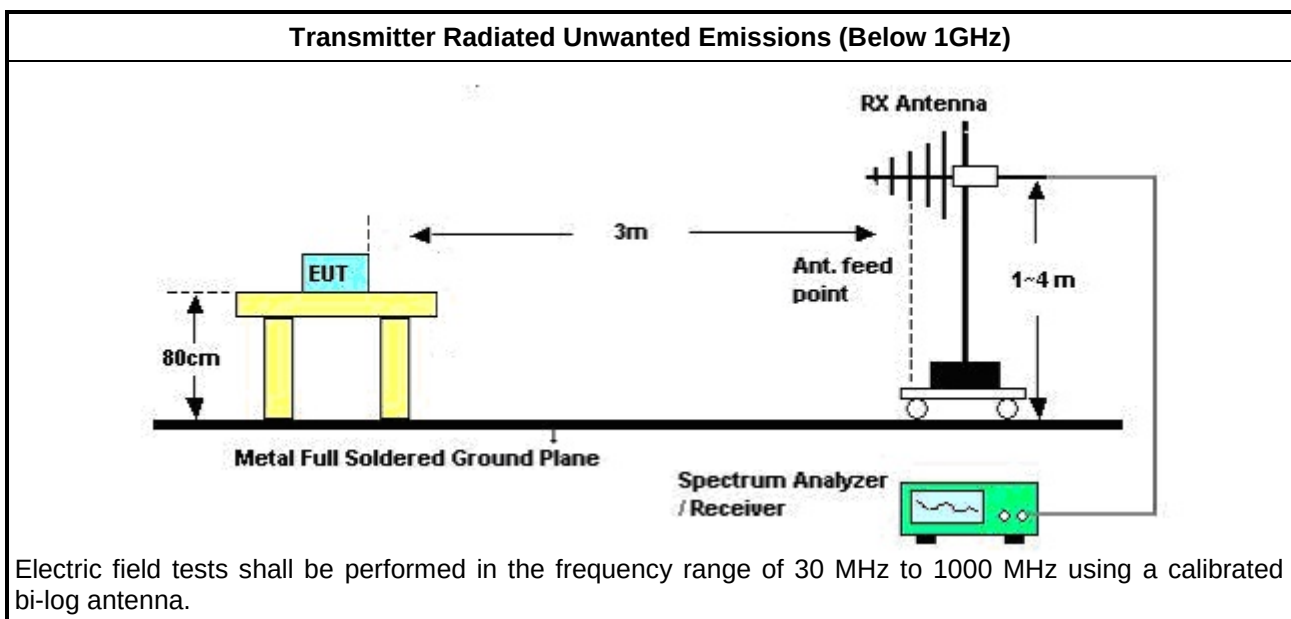
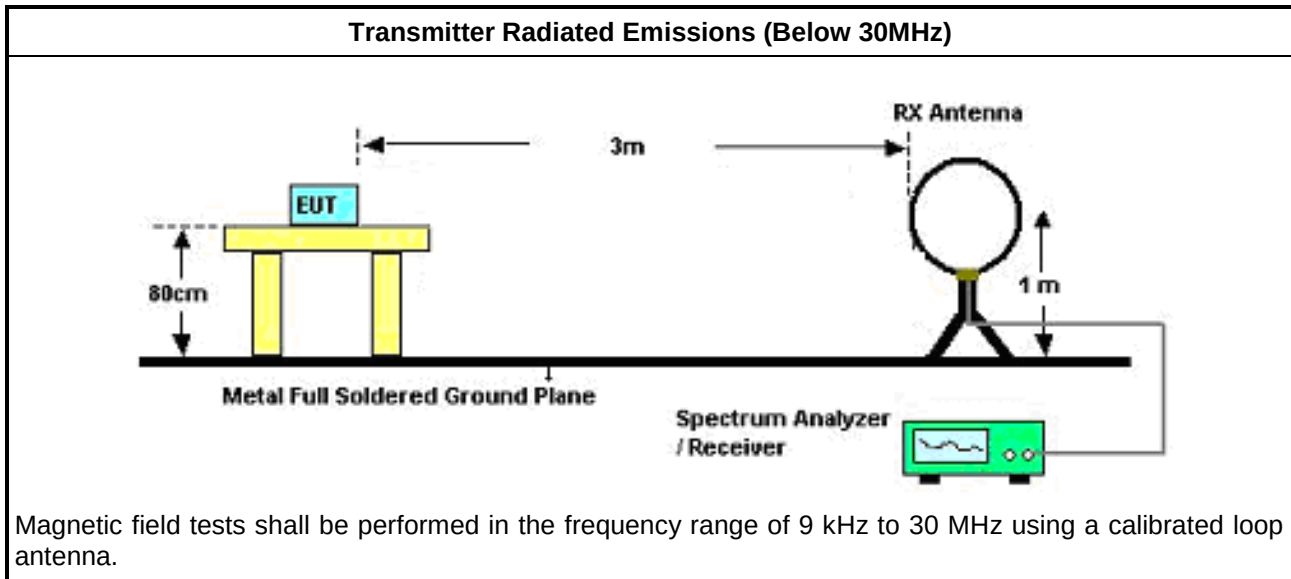
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
☒	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m.
☒	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz the frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 30MHz measurements employing a CISPR quasi-peak detector. Test distance is 3m.
☒	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods.
☐	The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
☒	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
☒	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.
☒	The any unwanted emissions level shall not exceed the fundamental emission level.
☒	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
☒	KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.
☒	Based on LP0002 5.5.2: measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
☒	Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

3.2.4 Test Setup



3.2.5 Transmitter Radiated Emissions (Below 30MHz)

Summary

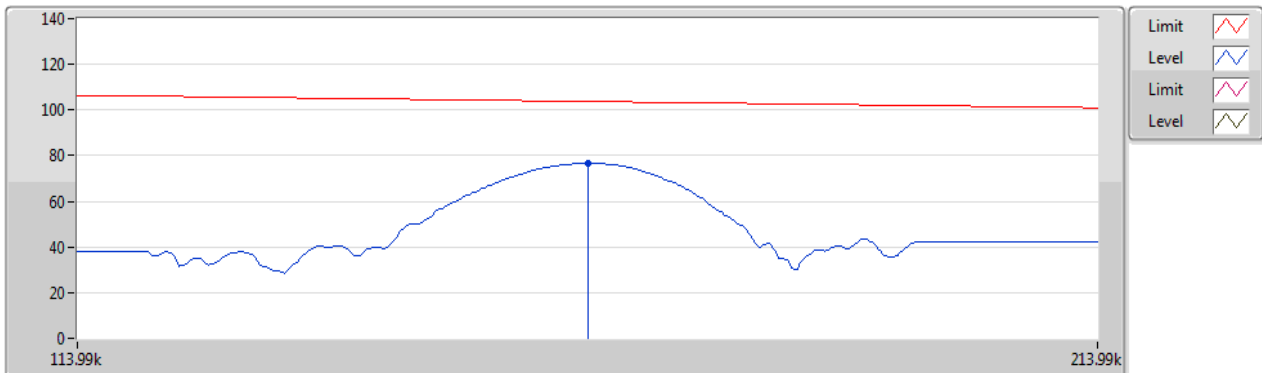
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
WPC	-	-	-	-	-	-	-	-	-	-	-	-
110-205kHz	Pass	PK	2.18M	57.88	69.54	-11.66	20.33	3	Horizontal	360	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
110-205kHz	-	-	-	-	-	-	-	-	-	-	-	-
0.1506MHz_TX	Pass	PK	156.19k	76.62	103.73	-27.11	20.20	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	13.23k	59.17	125.16	-65.99	20.06	3	Horizontal	0	1.00	-
0.1506MHz_TX	Pass	PK	34.944k	58.48	116.75	-58.27	21.27	3	Horizontal	0	1.00	-
0.1506MHz_TX	Pass	PK	112.212k	48.95	106.61	-57.66	20.03	3	Horizontal	0	1.00	-
0.1506MHz_TX	Pass	PK	269.4k	62.07	99.01	-36.94	20.48	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	2.18M	57.88	69.54	-11.66	20.33	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	3.672M	43.75	69.54	-25.79	20.56	3	Horizontal	360	1.00	-

110-205kHz

03/06/2020

0.1506MHz_TX


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	156.19k	76.62	103.73	-27.11	20.20	3	Horizontal	360	1.00	-	56.42	20.10	0.10	-

110-205kHz

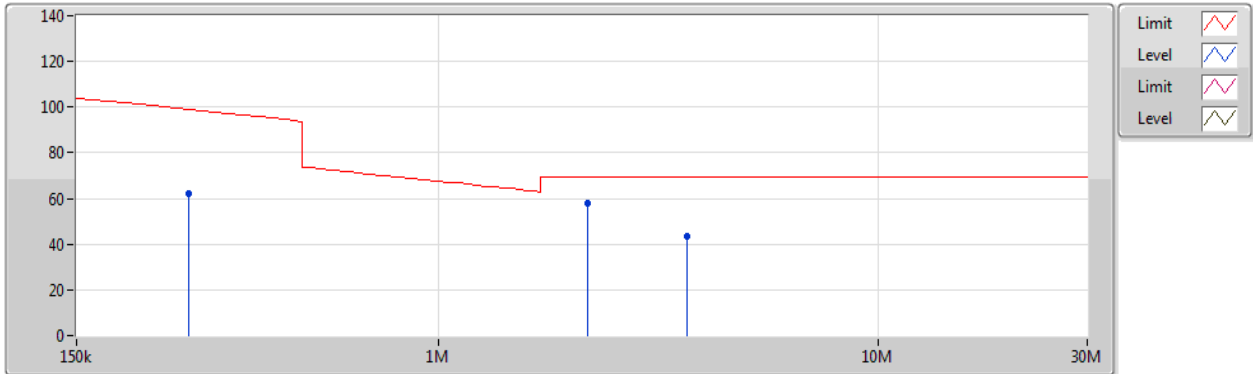
03/06/2020

0.1506MHz_TX


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	13.23k	59.17	125.16	-65.99	20.06	3	Horizontal	0	1.00	-	39.11	20.01	0.05	-
PK	34.944k	58.48	116.75	-58.27	21.27	3	Horizontal	0	1.00	-	37.21	21.20	0.07	-
PK	112.212k	48.95	106.61	-57.66	20.03	3	Horizontal	0	1.00	-	28.92	19.95	0.08	-

110-205kHz

03/06/2020

0.1506MHz_TX


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	269.4k	62.07	99.01	-36.94	20.48	3	Horizontal	360	1.00	-	41.59	20.35	0.13	-
PK	2.18M	57.88	69.54	-11.66	20.33	3	Horizontal	360	1.00	-	37.55	19.97	0.36	-
PK	3.672M	43.75	69.54	-25.79	20.56	3	Horizontal	360	1.00	-	23.19	20.16	0.40	-

3.2.6 Transmitter Radiated Emissions (Above 30MHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
WPC	-	-	-	-	-	-	-	-	-	-	-	-
110-205kHz	Pass	PK	37.76M	30.24	40.00	-9.76	-7.77	3	Horizontal	360	1.00	-

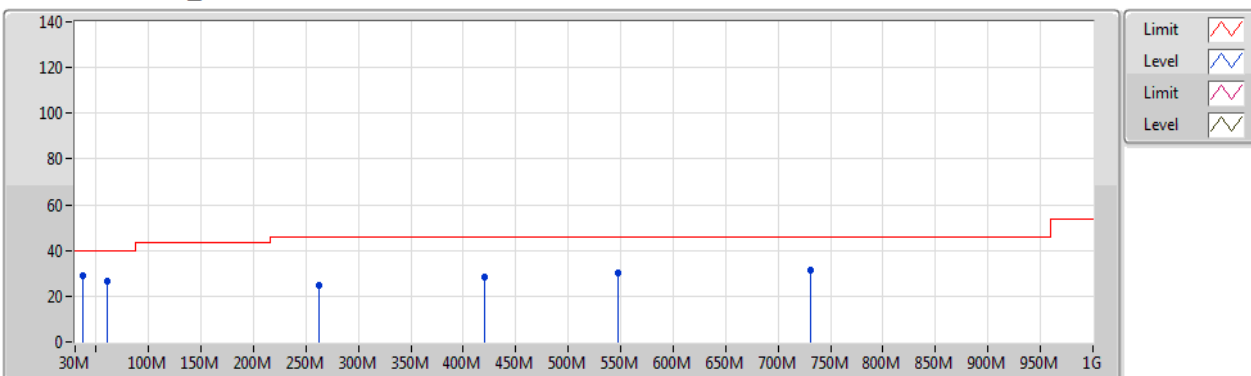
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
110-205kHz	-	-	-	-	-	-	-	-	-	-	-	-
0.1506MHz_TX	Pass	PK	37.76M	29.06	40.00	-10.94	-7.77	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	61.04M	26.67	40.00	-13.33	-15.11	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	262.8M	24.63	46.00	-21.37	-6.11	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	419.94M	28.58	46.00	-17.42	-3.06	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	547.98M	30.03	46.00	-15.97	-1.05	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	730.34M	31.51	46.00	-14.49	0.51	3	Vertical	0	1.00	-
0.1506MHz_TX	Pass	PK	37.76M	30.24	40.00	-9.76	-7.77	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	61.04M	23.41	40.00	-16.59	-15.11	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	140.58M	27.53	43.50	-15.97	-9.79	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	495.6M	30.33	46.00	-15.67	-2.09	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	740.04M	32.58	46.00	-13.42	0.72	3	Horizontal	360	1.00	-
0.1506MHz_TX	Pass	PK	932.1M	34.60	46.00	-11.40	3.01	3	Horizontal	360	1.00	-

110-205kHz

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0.1506MHz_TX

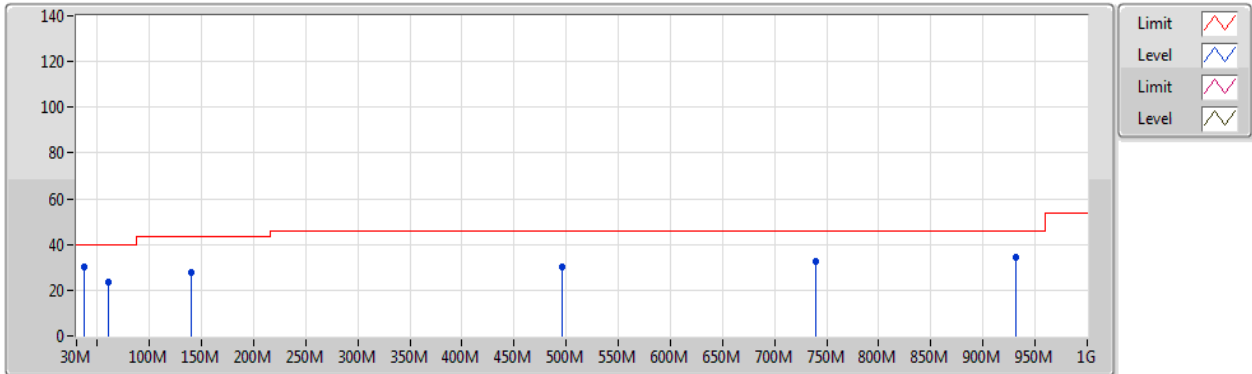


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	37.76M	29.06	40.00	-10.94	-7.77	3	Vertical	0	1.00	-	36.83	19.02	0.89	27.68
PK	61.04M	26.67	40.00	-13.33	-15.11	3	Vertical	0	1.00	-	41.78	11.44	1.15	27.70
PK	262.8M	24.63	46.00	-21.37	-6.11	3	Vertical	0	1.00	-	30.74	18.60	2.47	27.18
PK	419.94M	28.58	46.00	-17.42	-3.06	3	Vertical	0	1.00	-	31.64	21.83	3.16	28.05
PK	547.98M	30.03	46.00	-15.97	-1.05	3	Vertical	0	1.00	-	31.08	23.94	3.64	28.63
PK	730.34M	31.51	46.00	-14.49	0.51	3	Vertical	0	1.00	-	31.00	24.60	4.27	28.36

110-205kHz

0.1506MHz_TX

03/06/2020



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	37.76M	30.24	40.00	-9.76	-7.77	3	Horizontal	360	1.00	-	38.01	19.02	0.89	27.68
PK	61.04M	23.41	40.00	-16.59	-15.11	3	Horizontal	360	1.00	-	38.52	11.44	1.15	27.70
PK	140.58M	27.53	43.50	-15.97	-9.79	3	Horizontal	360	1.00	-	37.32	16.14	1.74	27.67
PK	495.6M	30.33	46.00	-15.67	-2.09	3	Horizontal	360	1.00	-	32.42	22.81	3.50	28.40
PK	740.04M	32.58	46.00	-13.42	0.72	3	Horizontal	360	1.00	-	31.86	24.77	4.30	28.35
PK	932.1M	34.60	46.00	-11.40	3.01	3	Horizontal	360	1.00	-	31.59	25.77	4.88	27.64

3.3 Emission Bandwidth

3.3.1 Emission Bandwidth Limit

Emission Bandwidth Limit
N/A

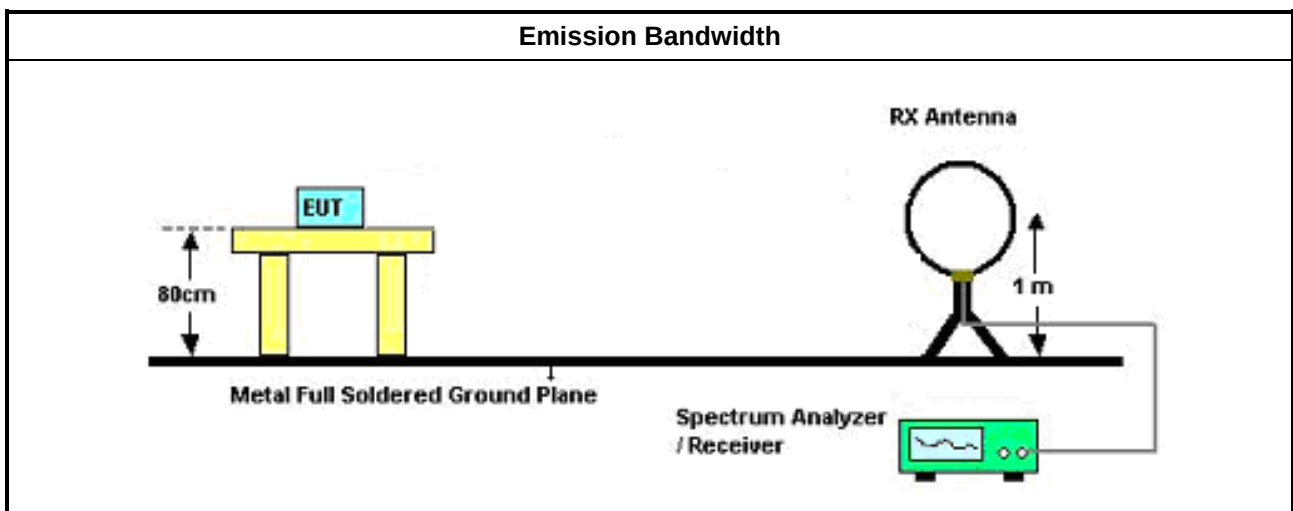
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

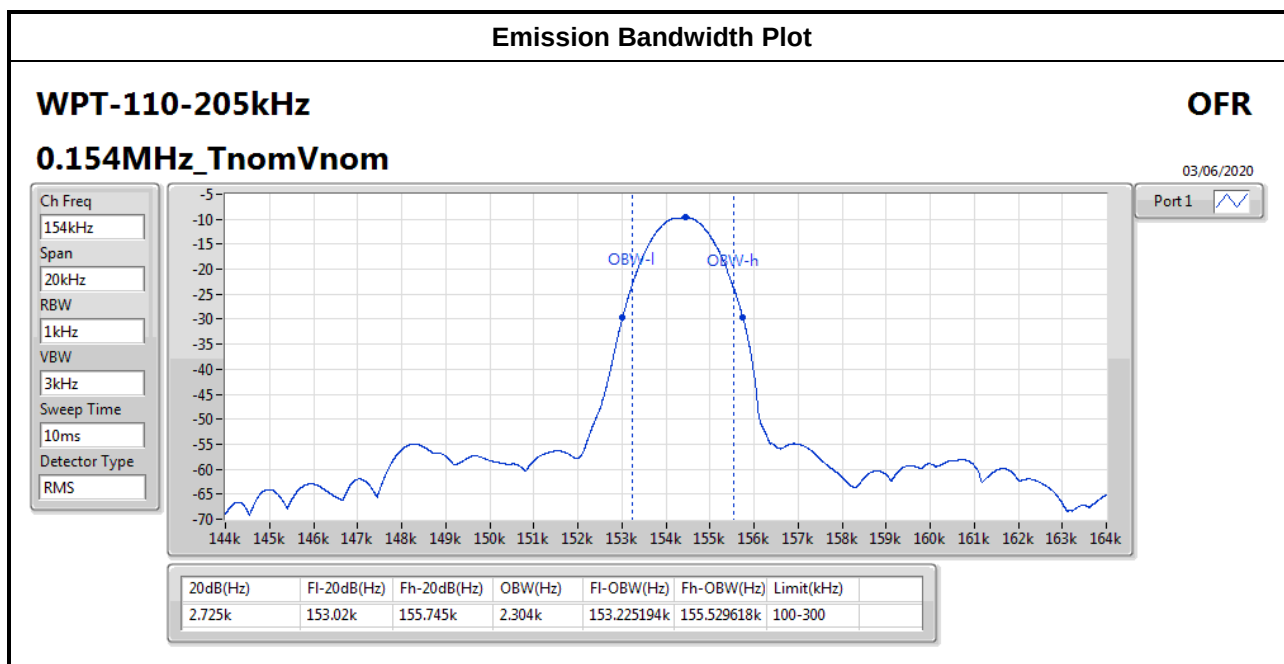
Test Method
☒ Because the measured signal is CW or CW-like adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.
☒ For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

3.3.4 Test Setup



3.3.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result			
Modulation Mode	Frequency (kHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
ASK	156.19	2.725	2.304
Limit		N/A	N/A
Result		Complied	



3.4 Receiver Radiated Spurious Emissions

3.4.1 Receiver in Radiated Spurious Emissions Limit

Restricted Spurious Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

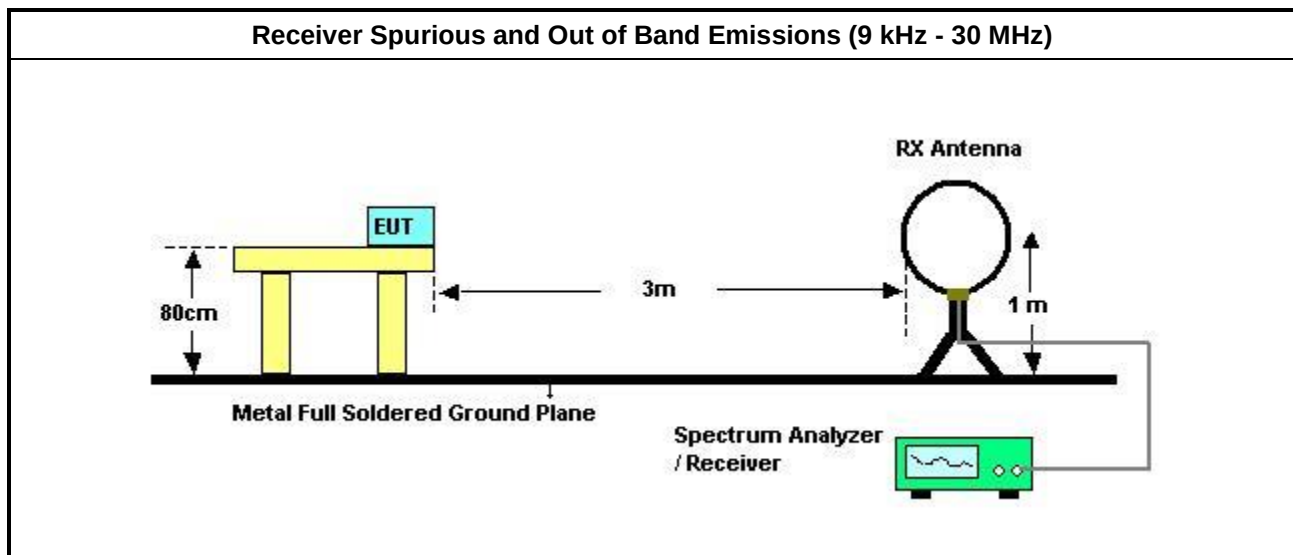
3.4.2 Measuring Instruments

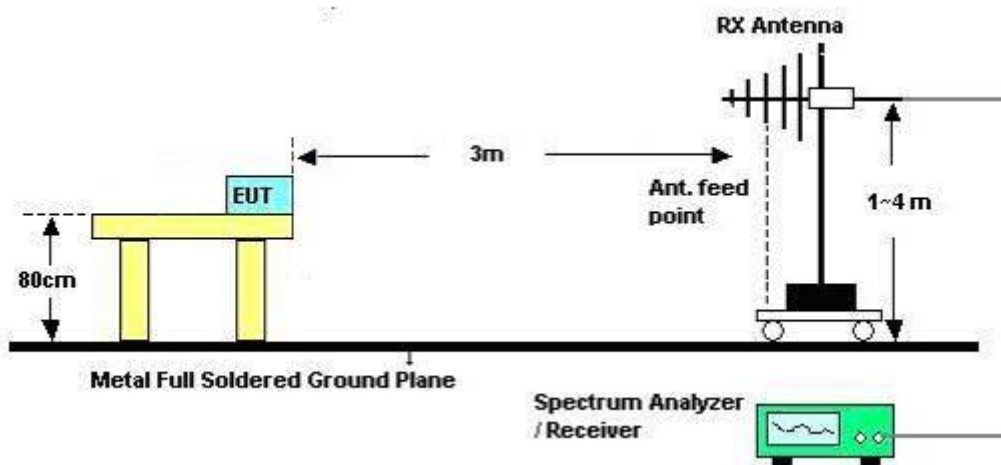
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
☒	The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.
☒	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
☒	For radiated measurement, refer as ANSI C63.4, clause 8.3.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from below 30 MHz.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from 30 MHz-1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the QP-Limit so that the QP level does not need to be reported in addition.
☐	Refer as ANSI C63.4, clause 8.3.1.2 and 8.3.2.2 for radiated emissions from above 1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
☒	All amplitude of spurious emissions that are attenuated by more than 30 dB below the permissible value has no need to be reported.

3.4.4 Test Setup



Receiver Radiated Unwanted Emissions (below 1GHz)


3.4.5 Receiver Radiated Emissions (Below 30MHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
WPC	-	-	-	-	-	-	-	-	-	-	-	-
110-205kHz	Pass	PK	2.299M	57.78	69.54	-11.76	20.31	3	Horizontal	360	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
110-205kHz	-	-	-	-	-	-	-	-	-	-	-	-
0.1506MHz_RX	Pass	PK	10.128k	64.08	127.48	-63.40	19.67	3	Horizontal	0	1.00	-
0.1506MHz_RX	Pass	PK	35.226k	58.16	116.67	-58.51	21.27	3	Horizontal	0	1.00	-
0.1506MHz_RX	Pass	PK	112.212k	47.62	106.61	-58.99	20.03	3	Horizontal	0	1.00	-
0.1506MHz_RX	Pass	PK	388.8k	58.27	95.81	-37.54	20.60	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	2.299M	57.78	69.54	-11.76	20.31	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	4.986M	40.12	69.54	-29.42	21.14	3	Horizontal	360	1.00	-

110-205kHz

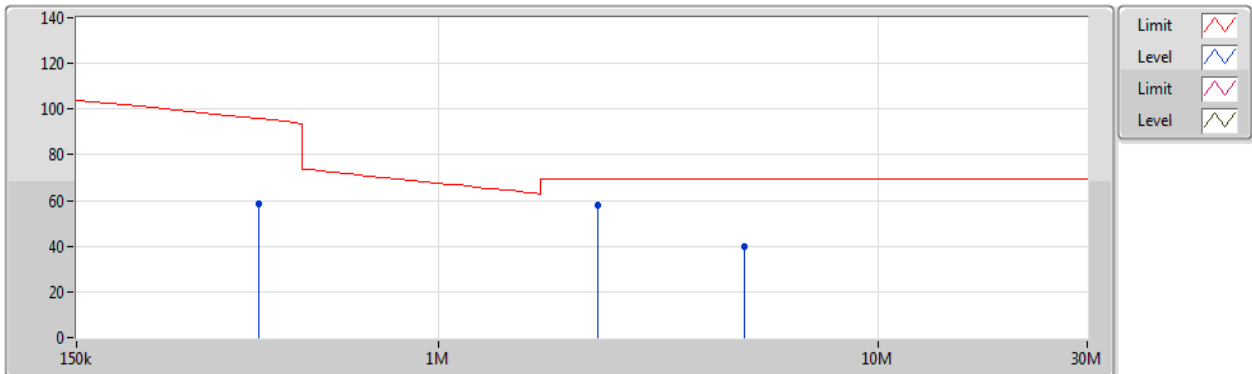
03/06/2020

0.1506MHz_RX


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	10.128k	64.08	127.48	-63.40	19.67	3	Horizontal	0	1.00	-	44.41	19.62	0.05	-
PK	35.226k	58.16	116.67	-58.51	21.27	3	Horizontal	0	1.00	-	36.89	21.20	0.07	-
PK	112.212k	47.62	106.61	-58.99	20.03	3	Horizontal	0	1.00	-	27.59	19.95	0.08	-

110-205kHz
0.1506MHz_RX

03/06/2020



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	388.8k	58.27	95.81	-37.54	20.60	3	Horizontal	360	1.00	-	37.67	20.45	0.15	-
PK	2.299M	57.78	69.54	-11.76	20.31	3	Horizontal	360	1.00	-	37.47	19.94	0.37	-
PK	4.986M	40.12	69.54	-29.42	21.14	3	Horizontal	360	1.00	-	18.98	20.70	0.44	-

3.4.6 Receiver Radiated Emissions (Above 30MHz)

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
WPC	-	-	-	-	-	-	-	-	-	-	-	-
110-205kHz	Pass	PK	30M	27.19	40.00	-12.81	-3.45	3	Horizontal	360	1.00	-

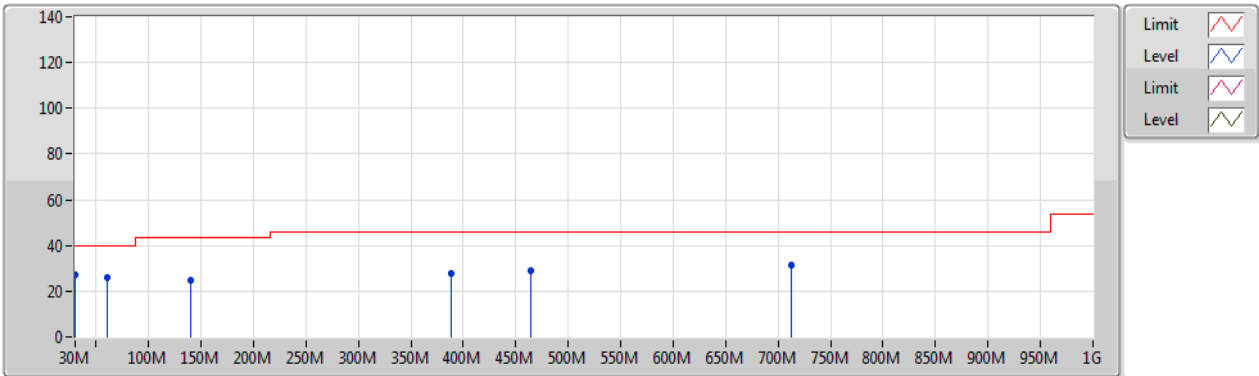
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
110-205kHz	-	-	-	-	-	-	-	-	-	-	-	-
0.1506MHz_RX	Pass	PK	30M	26.99	40.00	-13.01	-3.45	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	61.04M	25.79	40.00	-14.21	-15.11	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	140.58M	24.46	43.50	-19.04	-9.79	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	388.9M	27.68	46.00	-18.32	-4.24	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	464.56M	28.75	46.00	-17.25	-2.66	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	712.88M	31.51	46.00	-14.49	0.06	3	Vertical	0	1.00	-
0.1506MHz_RX	Pass	PK	30M	27.19	40.00	-12.81	-3.45	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	49.4M	21.48	40.00	-18.52	-13.29	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	266.68M	25.18	46.00	-20.82	-6.25	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	439.34M	28.45	46.00	-17.55	-3.26	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	551.86M	30.70	46.00	-15.30	-0.94	3	Horizontal	360	1.00	-
0.1506MHz_RX	Pass	PK	769.14M	31.98	46.00	-14.02	1.07	3	Horizontal	360	1.00	-

110-205kHz

03/06/2020

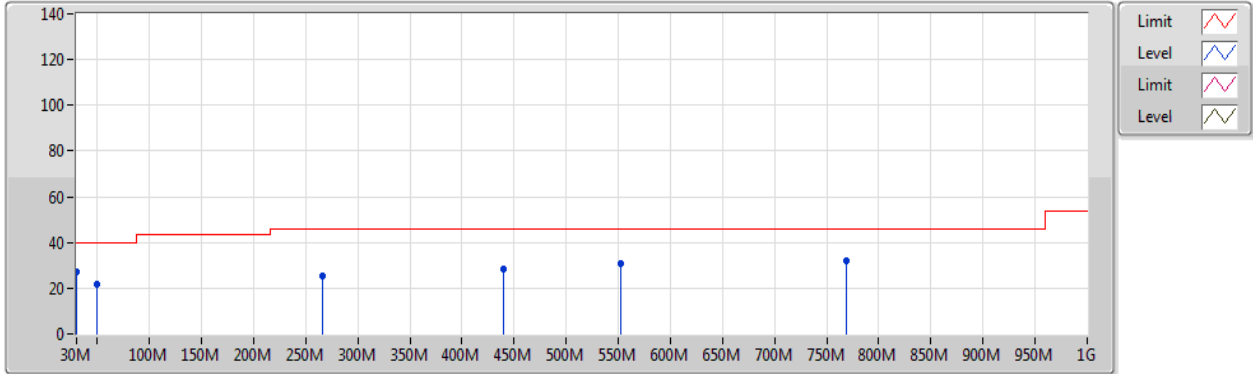
0.1506MHz_RX



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	30M	26.99	40.00	-13.01	-3.45	3	Vertical	0	1.00	-	30.44	23.48	0.77	27.70
PK	61.04M	25.79	40.00	-14.21	-15.11	3	Vertical	0	1.00	-	40.90	11.44	1.15	27.70
PK	140.58M	24.46	43.50	-19.04	-9.79	3	Vertical	0	1.00	-	34.25	16.14	1.74	27.67
PK	388.9M	27.68	46.00	-18.32	-4.24	3	Vertical	0	1.00	-	31.92	20.51	3.03	27.78
PK	464.56M	28.75	46.00	-17.25	-2.66	3	Vertical	0	1.00	-	31.41	22.33	3.35	28.34
PK	712.88M	31.51	46.00	-14.49	0.06	3	Vertical	0	1.00	-	31.45	24.20	4.23	28.37

110-205kHz
0.1506MHz_RX

03/06/2020



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	30M	27.19	40.00	-12.81	-3.45	3	Horizontal	360	1.00	-	30.64	23.48	0.77	27.70
PK	49.4M	21.48	40.00	-18.52	-13.29	3	Horizontal	360	1.00	-	34.77	13.37	1.03	27.69
PK	266.68M	25.18	46.00	-20.82	-6.25	3	Horizontal	360	1.00	-	31.43	18.44	2.49	27.18
PK	439.34M	28.45	46.00	-17.55	-3.26	3	Horizontal	360	1.00	-	31.71	21.71	3.24	28.21
PK	551.86M	30.70	46.00	-15.30	-0.94	3	Horizontal	360	1.00	-	31.64	24.04	3.65	28.63
PK	769.14M	31.98	46.00	-14.02	1.07	3	Horizontal	360	1.00	-	30.91	24.93	4.40	28.26

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR	102051	9kHz ~ 3.6GHz	29/May/2020	28/May/2021
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	04/Nov/2019	05/Nov/2020
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	12/Sep/2019	11/Sep/2020
AC POWER	APC	AFC-11005G	F310050055	47Hz ~ 63Hz 5 ~ 300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9kHz ~ 30MHz	24/Sep/2019	23/Sep/2020

NCR : Non-Calibration Require

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	10Hz ~ 40GHz	19/Mar/2020	18/Mar/2021
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	16/Mar/2020	15/Mar/2021

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	29/Aug/2019	28/Aug/2020
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	02/Jul/2019	01/Jul/2020
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9kHz ~ 40GHz	27/Feb/2020	26/Feb/2021
EMI Test Receiver	R&S	ESR	102052	9kHz ~ 3.6GHz	29/Apr/2020	28/Apr/2021
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	25/Mar/2020	24/Mar/2021
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	28/Feb/2020	27/Feb/2021
Loop Antenna	TESEQ	HLA 6120	31244	9k ~ 30MHz	16/Mar/2020	15/Mar/2021

Appendix A. Test Photos

1. Photographs of Conducted Emissions Test Configuration - TX

Front view



Rear view



Under table view



2. Photographs of Conducted Emissions Test Configuration - RX

Front view



Rear view



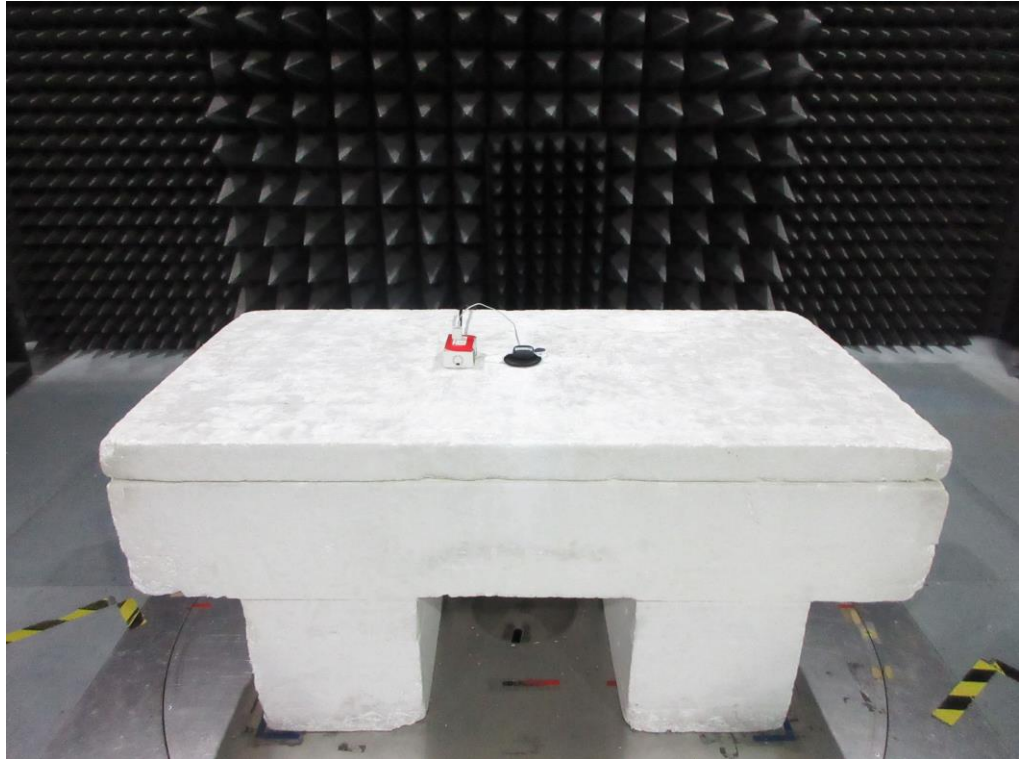
Under table view



3. Photographs of Radiated Emissions Test Configuration - TX

For radiated emissions 9kHz~30MHz

Front view

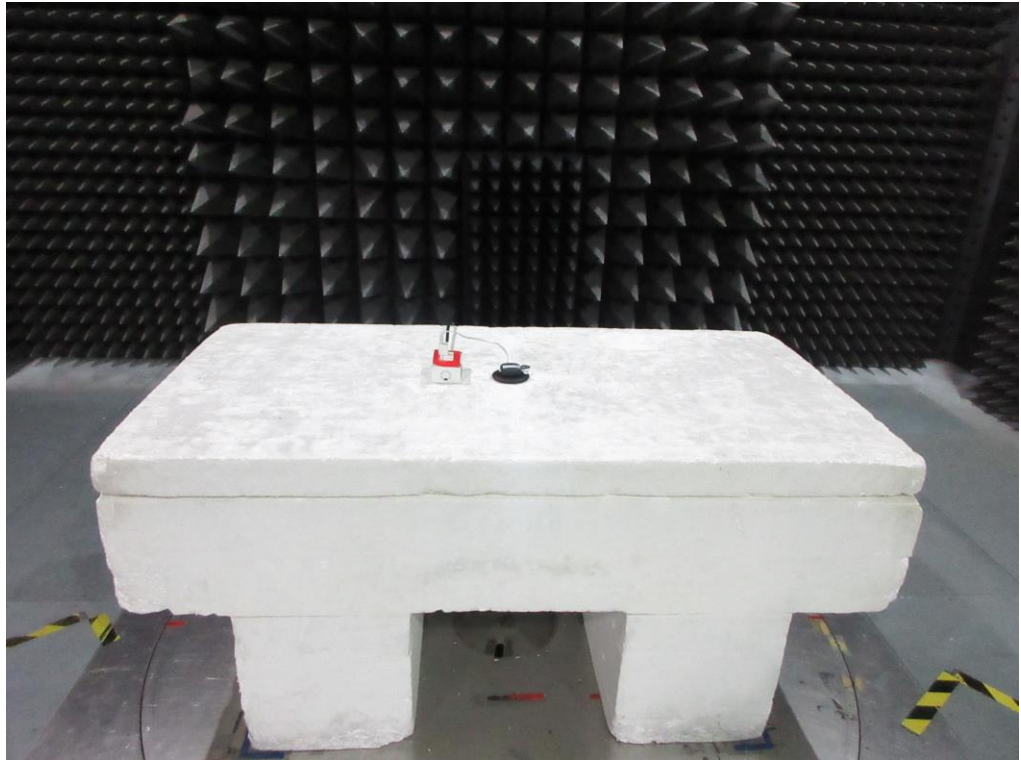


Rear view

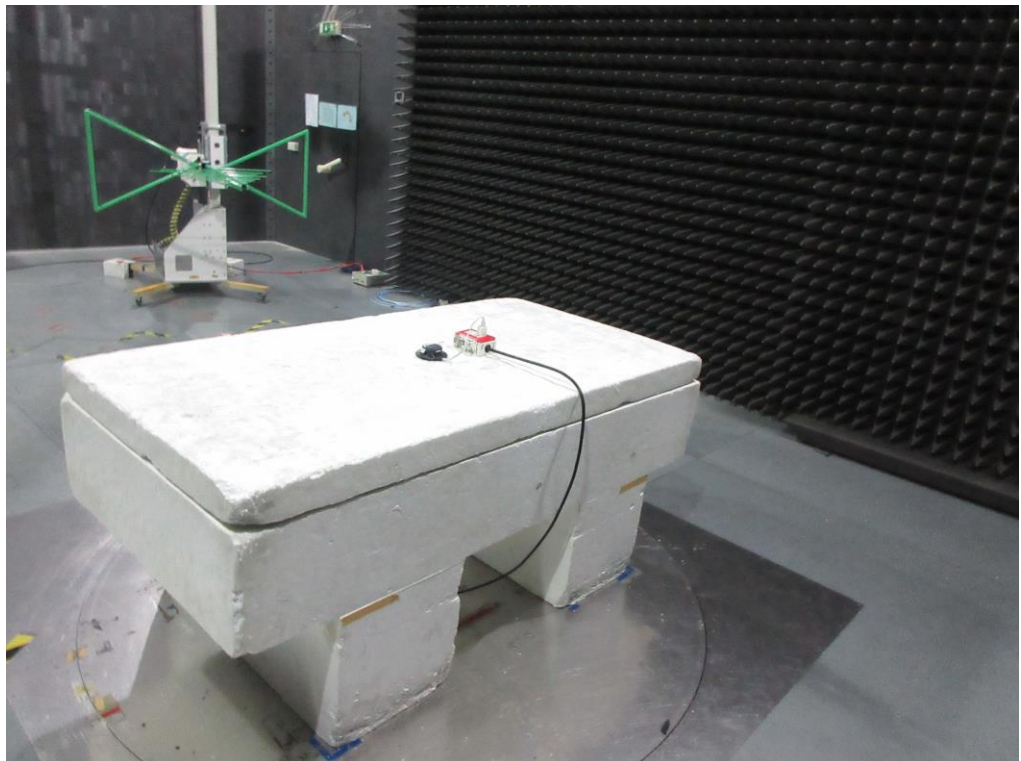


For radiated emissions 30kHz~1GHz

Front view



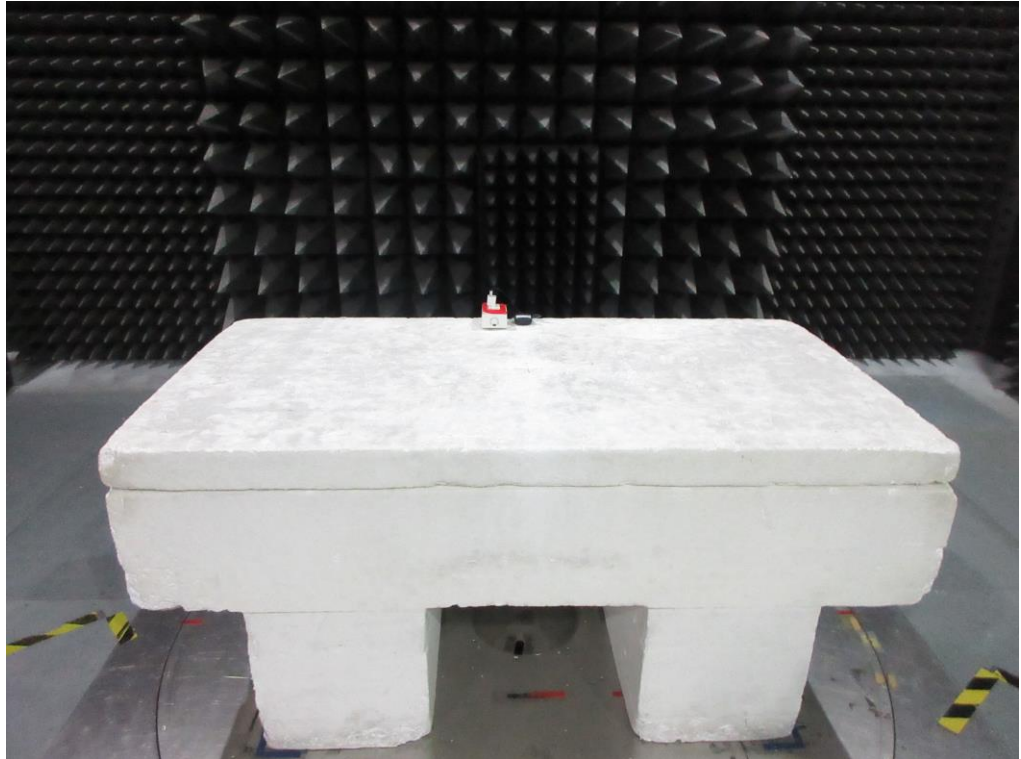
Rear view



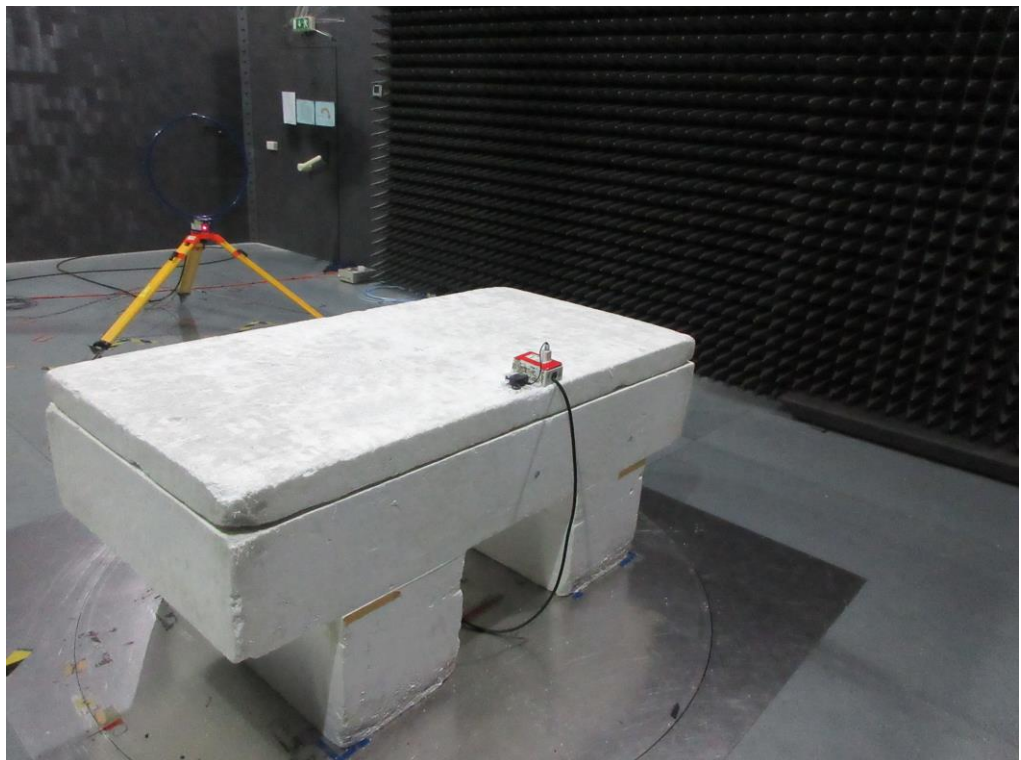
4. Photographs of Radiated Emissions Test Configuration - RX

For radiated emissions 9kHz~30MHz

Front view

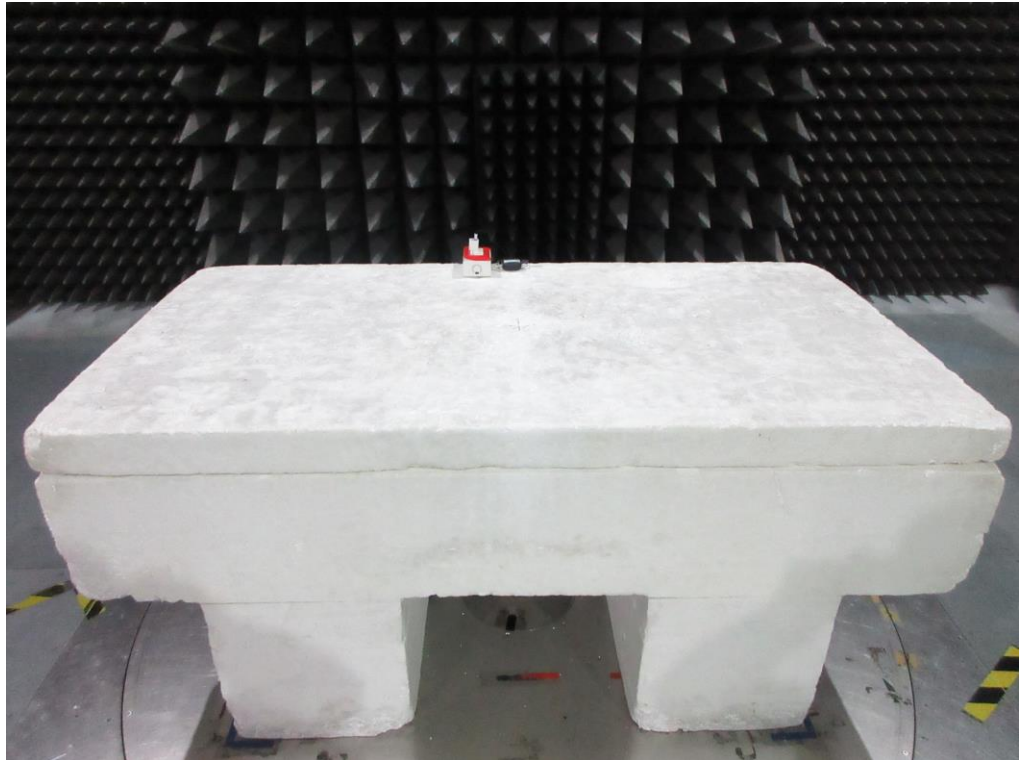


Rear view

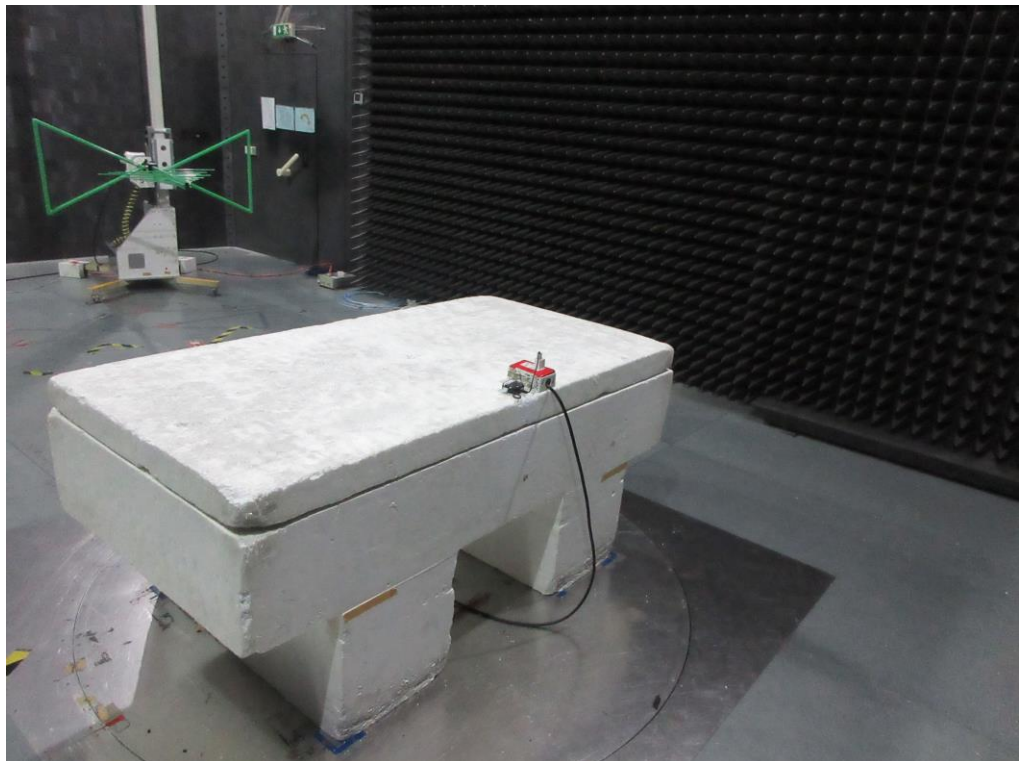


For radiated emissions 30kHz~1GHz

Front view



Rear view



————THE END————