

ETSI EN 300 330 V2.1.1 (2017-02)

TEST REPORT

For

XonTel Technology Trd. Co. W.L.L

Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait. zip code: 13065

Tested Model: XT-12P

Report Type: Amended Report	Product Type: Door Phone
Report Number:	RXM220104050-01C
Report Date:	2022-01-11
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Issue
1	RXM200819050-01C	Original Report	2020-09-16
2	RXM220104050-01C	Amended Report	2022-01-11

Note:

This is an amended report application based on RXM200819050-01C, the details as below:

1. Changing the applicant to “XonTel Technology Trd. Co. W.L.L”.
2. Changing the address to “Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait. zip code: 13065.”
3. Changing the trade name “Xontel”.
4. Changing model name to “XT-12P”

For above difference, We Updated the EUT external photographs, all test data and other photos were referred to the original report RXM200819050-01C that issued on 2020-09-16.

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	XonTel Technology Trd. Co. W.L.L
Tested Model	XT-12P
Operation Frequency	125kHz
Product Type	Door Phone
Power Supply	DC 12V power by External power supply or DC 48V power by POE
RF Function	RFID
Operating Band/Frequency	119~140kHz
Antenna Type	Loop antenna
*Maximum Antenna Gain	0.0 dBi

**Note: The maximum antenna gain was declared by the applicant.*

**All measurement and test data in this report was gathered from production sample serial number: 20200819050 (Assigned by the BACL(Kunshan). The EUT supplied by the applicant was received on 2020-08-19)*

Objective

This report is prepared on behalf of *XonTel Technology Trd. Co. W.L.L* in accordance with ETSI EN 300 330 V2.1.1 (2017-02), Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonized Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine the compliance of EUT with ETSI EN 300 330 V2.1.1 (2017-02).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 330 V2.1.1 (2017-02).

Measurement Uncertainty

Item		Uncertainty
RF Output Power with Power meter		0.5dB
Power Spectral Density, conducted		0.5dB
Unwanted Emissions, conducted		2.34 dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6 GHz ~18 GHz	4.92dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%
Time		5 %
Supply voltages		0.4%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical mode (as normally used by a typical user).

EUT Exercise Software

No software was used in the test.

Equipment Modifications

No modifications were made to the EUT tested

Support Equipment List and Details

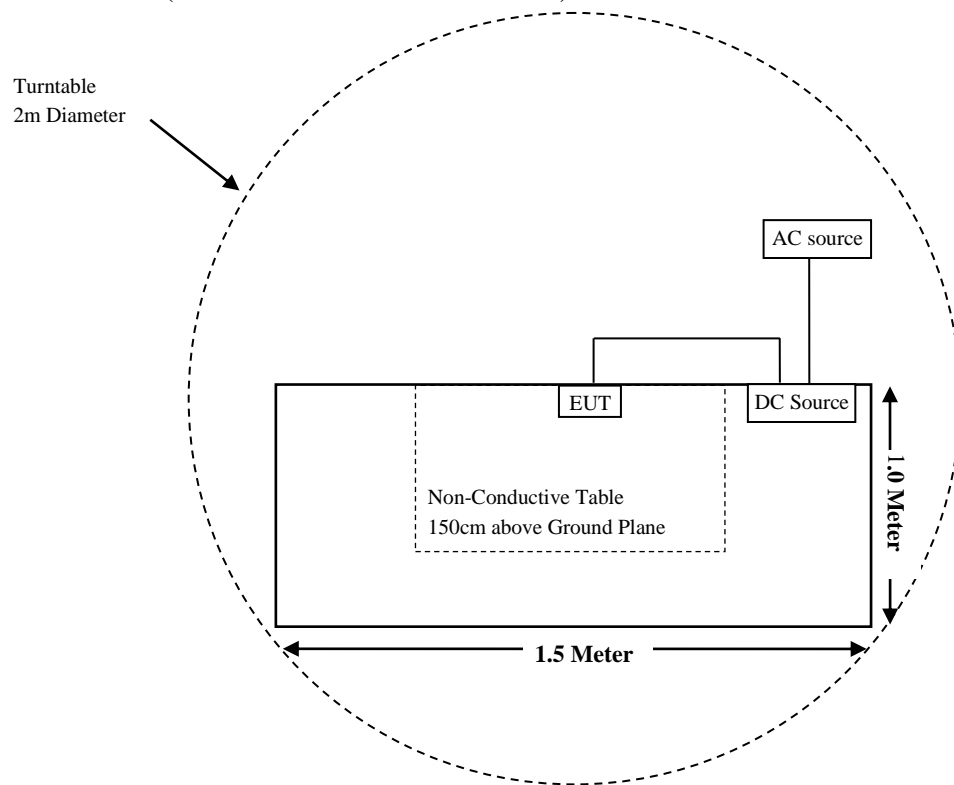
Manufacturer	Description	Model	Serial Number
ZHAOXIN	DC Power Supply	RXN-605D	DC002

External I/O Cable

Cable Description	Length (m)	From Port	To
Data Cable	1.0	EUT	DC Source
Power Cable	1.0	DC Source	AC Source

Block Diagram of Test Setup

Radiated Emissions (Below 30MHz & Above 30MHz):



SUMMARY OF TEST RESULTS

ETSI EN 300 330 V2.1.1 (2017-02)

EN 300 330 V2.1.1 Rules	Description of Test	Result
Transmitter Requirements		
Clause4.3.1	Permitted range of Operating Frequencies	Compliant
Clause4.3.2	Operating Frequency Ranges	Compliant
Clause4.3.3	Modulation Bandwidth	Compliant
Clause4.3.4	Transmitter H-field Requirements	Compliant
Clause4.3.5	Transmitter RF Carrier Current	Not Applicable (See Note1)
Clause4.3.6	Transmitter Radiated E-field	Not Applicable (See Note1)
Clause4.3.7	Transmitter Conducted Spurious Emissions	Not Applicable (See Note1)
Clause4.3.8	Transmitter Radiated Spurious Domain Emission Limits < 30 MHz	Compliant
Clause4.3.9	Transmitter Radiated Spurious Domain Emission Limits > 30 MHz	Compliant
Clause4.3.10	Transmitter Frequency Stability	Not Applicable (See Note2)
Receiver Requirements		
Clause4.4.2	Receiver Spurious Emissions	Compliant
Clause4.4.3	Adjacent Channel Selectivity	Not Applicable (See Note2)
Clause4.4.4	Receiver Blocking or Desensitization	Not Applicable (See Note3)

Note1: The EUT belongs to product class 1.

Note2: The EUT does not apply channelized systems.

Note3: The EUT does apply tagging systems.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-12-14	2020-12-13
ETS-LINDGREN	LOOP Antenna	6512	00108100	2019-04-25	2022-04-24
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2017-12-26	2020-12-25
Sunol Sciences	Bilog Antenna	JB3	A060217	2020-08-04	2023-08-03
Sonoma Instrument	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto Test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-7	007	2019-12-12	2020-12-11
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2019-12-14	2020-12-13
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-12-20	2020-12-19
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2019-10-10	2020-10-09
XonTel Technology Trd. Co. W.L.L	RF Cable	XonTel Technology Trd. Co. W.L.L C01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

ETSI EN 300 330 V2.1.1 (2017-02) CLAUSE 4.3.1 – PERMITTED RANGE OF OPERATING FREQUENCIES

Applicable Standard

According to EN 300 330 V2.1.1 (2017-02) Clause 4.3.1.3, The permitted range of operating frequencies for intentional emissions shall be entirely within the frequency bands in table 1.

Table 1: Short Range Devices within the 9 kHz to 30 MHz permitted frequency bands

	Frequency Bands/frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 MHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	984 kHz to 7 484 kHz (Note 3, Centre frequency is 4 234 kHz)	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz (Centre frequency is 13,56 MHz)	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 MHz to 27,100 MHz	Inductive devices, Railway applications
NOTE 1: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 9 kHz to 30 MHz.		
NOTE 2: On non-harmonised parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.		
NOTE 3: Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.		

The permitted range of operating frequencies used by the EUT shall be declared by the applicant. The operating frequency range(s) will be tested considered under in clause 4.3.2.

Test result: Compliant

ETSI EN 300 330 V2.1.1 (2017-02) CLAUSE 4.3.2 – OPERATING FREQUENCY RANGES

Applicable Standard

According to EN 300 330 V2.1.1 (2017-02) Clause 4.3.2.2, The operating frequency range (OFR) is the frequency range over which the EUT is transmitting. The operating frequency range of the EUT is determined by the lowest (fL) and highest frequency (fH) as occupied by the power envelope.

With the centre frequency of the OFR as: $f_C = (f_H + f_L)/2$.

An EUT could have more than one operating frequency range.

The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table 1.

Table 1: Short Range Devices within the 9 kHz to 30 MHz permitted frequency bands

	Frequency Bands/frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 MHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	984 kHz to 7 484 kHz (Note 3, Centre frequency is 4 234 kHz)	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz (Centre frequency is 13,56 MHz)	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 MHz to 27,100 MHz	Inductive devices, Railway applications
NOTE 1: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 9 kHz to 30 MHz.		
NOTE 2: On non-harmonised parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.		
NOTE 3: Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.		

Measurement Procedure

The measuring receiver may be a spectrum analyser, oscilloscope, selective power meter or any measuring receiver which is appropriate to perform the intended measurement of the EUT.

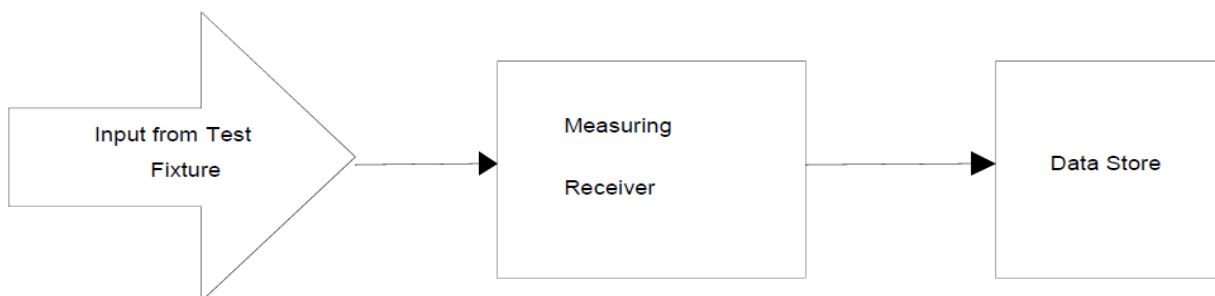


Figure 1: Test set-up for measurement of the operating frequencies

OFR measurement with spectrum analyzer

The measurement antenna shall be placed at one point of the setup up. Alternatively, a current probe could be used.

A spectrum analyser with the following settings is used as measuring receiver in the test set-up:

- Start frequency: lower than the lower edge of the permitted frequency range.
- Stop frequency: higher than the upper edge of the permitted frequency range.
- Resolution Bandwidth: see table 11.
- Video Bandwidth: \geq Resolution Bandwidth.
- Detector mode: RMS.
- Display mode: Maxhold.

The 99 % OBW function shall be used to determine the operating frequency range:

- f_H is determined. f_H is the frequency of the upper marker resulting from the OFR.
- f_L is determined. f_L is the frequency of the lower marker resulting from the OFR.
- f_c is the centre frequency $f_c = \frac{f_H + f_L}{2}$.

Alternatively, the recorded results from the H-field measurement described in clause 6.2.4 may be used.

Test Data

Environmental Conditions

Temperature:	22.7 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-08-31.

Test Mode: Transmitting

Test result: Compliant

Power Supply (V _{DC})	Temperature (°C)	Lowest Frequency (f _L) (kHz)	Highest Frequency (f _H) (kHz)	Minimum Limit (kHz)	Maximum Limit (kHz)
10.8	-20	124.585	125.397	119	140
	+25	124.576	125.388	119	140
	+55	124.581	125.393	119	140
12.0	-20	124.561	125.373	119	140
	+25	124.574	125.386	119	140
	+55	124.598	125.410	119	140
13.2	-20	124.544	125.356	119	140
	+25	124.573	125.385	119	140
	+55	124.58	125.392	119	140

Note : The extreme operating conditions as declared by the manufacturer.

ETSI EN 300 330 V2.1.1 (2017-02) CLAUSE 4.3.3 – MODULATION BANDWIDTH

Applicable Standard

According to ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.3.3.3, The modulation bandwidth shall be within the assigned frequency band see table 1 or $\pm 7,5\%$ of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4. For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

Method of Measurement

The transmitter shall be connected to an artificial antenna or if the transmitter has an integral antenna, a test fixture shall be used (see clause 5.10). The RF output of the equipment shall be connected to a spectrum analyzer via a $50\ \Omega$ variable attenuator.

The transmitter shall be operated at the nominal carrier power or field strength measured under normal test conditions in clause 4.3.4. The attenuator shall be adjusted to an appropriate level displayed at the spectrum analyzer screen.

The transmitter shall be modulated with standard test modulation (see clauses 5.8.1 and 5.8.2). If the equipment cannot be modulated externally, the internal modulation shall be used.

For transmitters using a continuous wideband swept carrier the measurement shall be made with the sweep on.

The output of the transmitter, with or without test fixture, shall be measured by using a spectrum analyser with a resolution bandwidth appropriate to accept all major side bands. The power level calibration of the spectrum analyzer shall then be related to the power level or field strength measured in clause 4.3.3. The calculation will be used to calculate the absolute level of the sideband power.

The test laboratory shall ensure that the spectrum analyzer's span is sufficiently wide enough to ensure that the carrier and all its major side bands are captured.

The frequency of the upper and lower points, where the displayed power envelope of the modulation including frequency drift is equal to the appropriate level defined in clause 4.3.3 is recorded as the modulation bandwidth.

Measurement Result

Environmental Conditions

Temperature:	27.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-09-01.

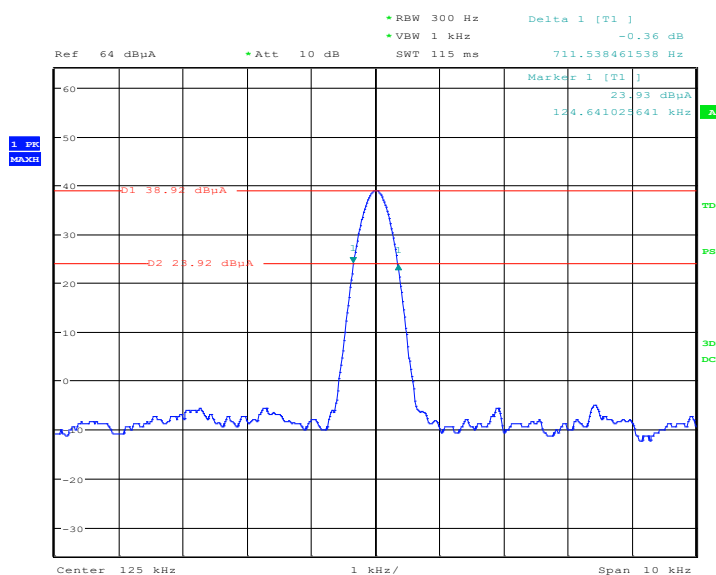
Test Mode: Transmitting

Test result: Compliant

Power Supply (V _{DC})	Temperature (°C)	f _L at Operating Frequency (kHz)	f _H at Operating Frequency (kHz)	f _L Limit (kHz)	f _H Limit (kHz)
10.8	-20	124.682	125.394	119	140
	+25	124.644	125.356	119	140
	+55	124.659	125.371	119	140
12.0	-20	124.626	125.338	119	140
	+25	124.641	125.353	119	140
	+55	124.689	125.401	119	140
13.2	-20	124.653	125.365	119	140
	+25	124.631	125.343	119	140
	+55	124.687	125.399	119	140

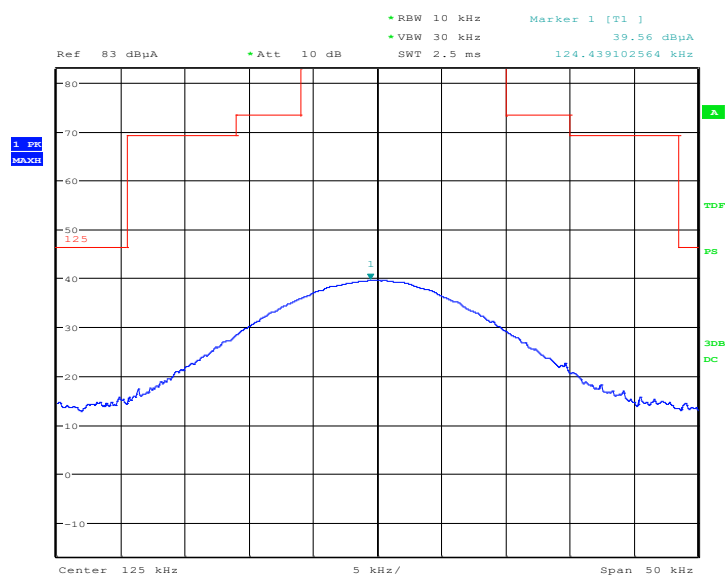
Note : The extreme operating conditions as declared by the manufacturer.

23 dB Modulation Bandwidth



Date: 8.SEP.2020 15:41:52

Emission Mask



Date: 8.SEP.2020 15:52:48

Note:

$$H_{3\text{ m}} \text{ Limit} = H_{10\text{ m}} \text{ Limit} + C_3; (C_3=31.3)$$

C_3 is a conversion factor in dB determined from figure H.2.

ETSI EN 300 330 V2.1.1 (2017-02) CLAUSE 4.3.4 – TRANSMITTER H-FIELD REQUIREMENTS

Applicable Standard

According to EN 300 330 V2.1.1 (2017-02) section 4.3.4.2, In the case of a transmitter with an integral or dedicated antenna, the radiated H-field is defined in the direction of maximum field strength under specified conditions of measurement.

The frequency ranges and limits of the present document are shown in table 2. The limits are based on the European Commission Decision for SRDs [i.10], CEPT/ERC/REC 70-03 [i.1].

Table 2: H-field limits at 10 m

Frequency range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
$0,009 \leq f < 0,090$	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
$0,09 \leq f < 0,119$	42
$0,119 \leq f < 0,135$	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
$0,135 \leq f < 0,140$	42
$0,140 \leq f < 0,1485$	37,7
$0,1485 \leq f < 30$	-5 (see note 4)
$0,315 \leq f < 0,600$	-5
$3,155 \leq f < 3,400$	13,5
4,234	9 (see note 9)
4,516	7
$7,400 \leq f < 8,800$	9
$10,2 \leq f < 11,00$	9
$12,5 \leq f \leq 20$	-7
$6,765 \leq f \leq 6,795$	42 (see notes 3 and 7)
$26,957 \leq f \leq 27,283$	42 (see note 3)
$13,410 \leq f \leq 13,553$, $13,567 \leq f \leq 13,710$	9 (see note 6)
$13,110 \leq f \leq 13,410$, $13,710 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110$, $14,010 \leq f \leq 14,460$	-10 (see note 6)
$11,810 \leq f \leq 12,660$, $14,460 \leq f \leq 15,310$	-16 (see note 6)
$13,460 \leq f \leq 13,553$, $13,567 \leq f \leq 13,660$	27 (see note 6)
$13,360 \leq f \leq 13,460$, $13,660 \leq f \leq 13,760$	Linear transition from 27 to -3,5 (see note 6)
$13,110 \leq f \leq 13,360$, $13,760 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110$, $14,010 \leq f \leq 14,460$	-5 (see note 6)
$13,553 \leq f \leq 13,567$	42 (see note 3) or 60 (see notes 2 and 3)
27,095	42

Frequency range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100 mW
<p>NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBμA/m:</p> <ul style="list-style-type: none"> - for loop coil antennas with an area $\geq 0,16 \text{ m}^2$ this table and table B.1 with the antenna limitations apply; - for loop coil antennas with an area between $0,05 \text{ m}^2$ and $0,16 \text{ m}^2$ table B.1 applies with a correction factor. The limit is: table value + $10 \times \log(\text{area}/0,16 \text{ m}^2)$; - for loop coil antennas with an area $< 0,05 \text{ m}^2$ the limit is 10 dB below table B.1. <p>NOTE 2: For RFID (incl. NFC) and EAS applications only.</p> <p>NOTE 3: Spectrum mask limit, see annex I.</p> <p>NOTE 4: For further information see annex G.</p> <p>NOTE 5: Limit is 42 dBμA/m for the following spot frequencies: 60 kHz \pm 250 Hz, 66,6 kHz \pm 750 Hz, 75 kHz \pm 250 Hz, 77,5 kHz \pm 250 Hz, and 129,1 kHz \pm 500 Hz.</p> <p>NOTE 6: Only in conjunction with spectrum mask, see annex I.</p> <p>NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonised ISM frequency band according article 5.138 of the ITU Radio Regulations [i.13].</p> <p>NOTE 8: Center frequencies for channelized systems by using $\leq 10 \text{ kHz}$ bandwidth.</p> <p>NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.</p>	

For calculation rules for limits at other measurement distances, see annex H.

Measurement Procedure

The measurements of the transmitter radiated H-field shall be made on an open field test site as specified in clause C.1.3. Any measured values shall be at least 6 dB above the ambient noise level.

The H-field produced by the equipment shall be measured at standard distance of 10 m. Where this is not practical, e.g. due to physical size of the equipment including the antenna or with use of special field cancelling antenna, then other distances may be used. When another distance is used, the distance used and the field strength value measured shall be stated in the test report. In this case, the measured value at actual test distance shall be extrapolated to 10 m according to annex H and these calculations shall be stated in the test report.

The H-field is measured with a shielded loop antenna connected to a measurement receiver. The measuring bandwidth and detector type of the measurement receiver shall be in accordance with clause 5.12.

The equipment under test shall operate where possible, with modulation. Where this is not possible, it shall be stated in the test report.

For transmitters using a continuous wideband swept carrier, the measurement shall be made with the sweep off. When it is not possible to turn the sweep off the measurements shall be made with the sweep on and this shall be stated in the test report.

For measuring equipment calibrated in dB μ V/m, the reading should be reduced by 51,5 dB to be converted to dB μ A/m.

Test Data**Environmental Conditions**

Temperature:	22.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-09-02.

Test Mode: Transmitting

Test result: Compliant

Indicated		Table Angle Degree	Antenna Height (cm)	Detector PK/QP/ Ave.	Correction Factor			Corrected Amplitude (dBμV/m) @ 3m	Corrected Amplitude (dBμA/m) @ 3m	EN 300 330		
Freq. (MHz)	Maximum Reading (dBμV) @ 3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)			Limit		Margin (dB)
										(dBμA/m) @ 10m	(dBμA/m) @ 3m	
0.125	65.31	V	0.8	QP	58.1	0.02	32	91.43	39.93	15.61	46.91	6.98

fo = 125kHz; Vnor =12V _{DC}			
Test Condition		Correction amplitude (dBμA/m) @3m	Note
Temperature (°C)	Power Supply (input V _{DC})		
T _{min} = -20	10.8	39.91	Extreme Condition
	12.0	39.95	Extreme Condition
	13.2	39.89	Extreme Condition
T _{nor} = +25	10.8	39.93	Extreme Condition
	12.0	39.93	Normal Condition
	13.2	39.95	Extreme Condition
T _{max} = +55	10.8	39.84	Extreme Condition
	12.0	39.86	Extreme Condition
	13.2	39.81	Extreme Condition

Note:

According to ETSI EN 300 330 V2.1.1 (2017-02), for measuring equipment calibrated in dBμV/m, the reading should be reduced by 51, 5 dB to be converted to dBμA/m.

That the tested distance between EUT and receiver, is 3 meters and according to annex H and these calculations shall be stated in the test report. The calculated Limit at 3 m distance as, $H_{3m} = H_{10m} + C_3$; ($C_3=31.3$)

H_{10m} is the H-field limit in dBμA/m at 10 m distance according to the present document;

C_3 is a conversion factor in dB determined from figure H.2.

ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.3.8 – TRANSMITTER RADIATED SPURIOUS DOMAIN EMISSION LIMITS < 30 MHz

Applicable Standard

According to ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.3.8.3, The radiated field strength of the spurious domain emissions below 30 MHz shall not exceed the generated H-field dB μ A/m at 10 m given in table 5.

Table 5

State	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Operating	27 dB μ A/m at 9 kHz descending 3 dB/oct	-3,5 dB μ A/m
Standby	5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

Methods of measurement

The field strength shall be measured for frequencies below 30 MHz. The equipment under test shall be measured at a distance of 10 m on an outdoor test site. The test antenna shall be a calibrated shielded magnetic field antenna. The equipment under test and test antenna shall be arranged as stated in clause C.1.

For Product Class 3 the transmitter antenna connector of the equipment under test shall be connected to an artificial antenna (see clause 5.9) and the output connector terminated.

The equipment under test shall be switched on with normal modulation. The characteristics of the modulation signal used shall be stated on the test report. The measuring receiver shall be tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter is intended to operate.

At each frequency at which a relevant spurious signal is detected the equipment under test and the test antenna shall be rotated until maximum field strength is indicated on the measuring receiver. This level shall be noted.

If the transmitter can be operated in the standby mode, then the measurements shall be repeated in the standby mode.

For measuring equipment calibrated in dB μ V/m, the reading should be reduced by 51,5 dB to be converted to dB μ A/m.

Test Data

Environmental Conditions

Temperature:	22.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-09-02.

Test Mode: Transmitting

Test result: Compliant

Below 30 MHz:

Indicated		Table Angle Degree	Antenna Height (cm)	Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBμV/m) @3m	Corrected Amplitude (dBμA/m) @3m	EN 300 330		
Freq. (MHz)	Maximum Reading (dBμV) @3m				Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)			Limit		Margin (dB)
										(dBμA/m) @10m	(dBμA/m) @3m	
0.082	56.93	78	150	QP	68.22	0.06	28	97.21	45.71	17.49	48.79	3.08
27.62	31.65	65	150	QP	34.32	0.13	28	38.1	-13.4	-3.5	12.01	25.41

Note1: According to ETSI EN 300 330 V2.1.1 (2017-02), for measuring equipment calibrated in dBμV/m, the reading should be reduced by 51, 5 dB to be converted to dBμA/m.

Note2: that the tested distance between EUT and receiver, is 3 meters and according to annex H and these calculations shall be stated in the test report. The calculated Limit at 3 m distance as, $H_3\text{ m} = H_{10\text{ m}} + C_3$; ($C_3 = 31.3$ for 0.082MHz, $C_3 = 15.51$ for 27.62MHz).

$H_{10\text{m}}$ is the H-field limit in dBμA/m at 10 m distance according to the present document;

C_3 is a conversion factor in dB determined from figure H.2.

ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.3.9 – TRANSMITTER RADIATED SPURIOUS DOMAIN EMISSION LIMITS > 30 MHz

Applicable Standard

According to ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.3.9.3, The power of any radiated emission shall not exceed the values given in table 6.

Table 6

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW
Standby	2 nW	2 nW

Methods of measurement

This method applies to all EUT.

For classes 1, 2 and 4 an appropriate test site selected from annex C shall be used. The equipment shall be placed at the specified height on a non-conducting support and in the position closest to normal use as declared by the manufacturer.

For Product Class 3 (see clause B.2) the transmitter antenna port shall be connected to an artificial antenna (see clause 5.9).

The test antenna shall be oriented for vertical polarization. The output of the test antenna shall be connected to a measuring receiver.

The transmitter shall be switched on with normal modulation, and the measuring receiver shall be tuned over the frequency range 30 MHz to 1 000 MHz.

At each frequency at which a relevant spurious component is detected, the test antenna shall be raised and lowered through the specified range of heights until a maximum signal level is detected on the measuring receiver.

The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

The maximum signal level detected by the measuring receiver shall be noted.

The substitution antenna shall be oriented for vertical polarization and calibrated for the frequency of the spurious component detected.

The frequency of the calibrated signal generator shall be set to the frequency of the spurious component detected. The input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver, if necessary.

The test antenna shall be raised and lowered through the specified range of heights to ensure that the maximum signal is received.

When a test site according to clause C.1.1 is used, there is no need to vary the height of the antenna. The input signal to the substitution antenna shall be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.

The input signal to the substitution antenna shall be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver.

The measure of the effective radiated power of the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

If an unmodulated carrier cannot be obtained then the measurements shall be made with the transmitter modulated by the normal test signal (see clause 5.8.2) in which case this fact shall be recorded in the test report.

If standby mode is available, the measurements shall be repeated in that mode.

Test Data

Environmental Conditions

Temperature:	22.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-09-03.

Test Mode: Transmitting

Test Result: Compliant

Above 30 MHz:

Frequency (MHz)	Maximum Reading (dBμV) @ 3m	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN300330	
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)		Limit (dBm)	Margin (dB)
64.56	50.66	272	150	V	-55.01	0.28	-10.09	-65.38	-54	11.38
87.59	50.94	60	150	V	-52.99	0.31	-7.17	-60.47	-54	6.47
189.81	47.29	91	150	V	-56.89	0.41	-4.40	-61.7	-54	7.7
199.96	45.33	58	150	V	-59.75	0.42	-3.95	-64.12	-54	10.12
227.86	46.29	93	150	V	-61.36	0.43	-3.00	-64.79	-54	10.79
693.76	39.26	64	150	V	-60.39	0.62	-1.68	-62.69	-54	8.69

ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.4.2 – RECEIVER SPURIOUS EMISSIONS

Applicable Standard

According to ETSI EN 300 330 V2.1.1 (2017-02) Clause 4.4.2.3, The spurious components below 30 MHz shall not exceed the generated H-field dB μ A/m values at 10 m according to table 8.

Table 8: Receiver spurious radiation limits

Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

The spurious components above 30 MHz measured values shall not exceed 2 nW.

Methods of measurement (<30 MHz)

The field strength shall be measured for frequencies below 30 MHz. The equipment under test shall be measured at a distance of 10 m on an outdoor test site. The test antenna shall be a calibrated shielded magnetic field antenna. The equipment under test and test antenna shall be arranged as stated in clause C.1.

For Product Class 3 the transmitter antenna connector of the equipment under test shall be connected to an artificial antenna (see clause 5.9) and the output connector terminated.

The equipment under test shall be switched on with normal modulation. The characteristics of the modulation signal used shall be stated on the test report. The measuring receiver shall be tuned over the frequency range 9 kHz to 30 MHz, except for the frequency band on which the transmitter is intended to operate.

At each frequency at which a relevant spurious signal is detected the equipment under test and the test antenna shall be rotated until maximum field strength is indicated on the measuring receiver. This level shall be noted.

If the transmitter can be operated in the standby mode, then the measurements shall be repeated in the standby mode.

For measuring equipment calibrated in dB μ V/m, the reading should be reduced by 51,5 dB to be converted to dB μ A/m.

Methods of measurement (≥ 30 MHz)

This method applies to all EUT.

For classes 1, 2 and 4 an appropriate test site selected from annex C shall be used. The equipment shall be placed at the specified height on a non-conducting support and in the position closest to normal use as declared by the manufacturer.

For Product Class 3 (see clause B.2) the transmitter antenna port shall be connected to an artificial antenna (see clause 5.9).

The test antenna shall be oriented for vertical polarization. The output of the test antenna shall be connected to a measuring receiver.

The transmitter shall be switched on with normal modulation, and the measuring receiver shall be tuned over the frequency range 30 MHz to 1 000 MHz.

At each frequency at which a relevant spurious component is detected, the test antenna shall be raised and lowered through the specified range of heights until a maximum signal level is detected on the measuring receiver.

The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

The maximum signal level detected by the measuring receiver shall be noted.

The substitution antenna shall be oriented for vertical polarization and calibrated for the frequency of the spurious component detected.

The frequency of the calibrated signal generator shall be set to the frequency of the spurious component detected. The input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver, if necessary.

The test antenna shall be raised and lowered through the specified range of heights to ensure that the maximum signal is received.

When a test site according to clause C.1.1 is used, there is no need to vary the height of the antenna. The input signal to the substitution antenna shall be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.

The input signal to the substitution antenna shall be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver.

The measure of the effective radiated power of the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

If an unmodulated carrier cannot be obtained then the measurements shall be made with the transmitter modulated by the normal test signal (see clause 5.8.2) in which case this fact shall be recorded in the test report.

If standby mode is available, the measurements shall be repeated in that mode.

Convert reading by 51,5 dB for measuring equipment calibrated in dBμV or dBμV/m.

Test Data**Environmental Conditions**

Temperature:	22.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2020-09-03.

Test Mode: Receiving

Test Result: Compliant

9 kHz-30 MHz:

Indicated Freq. (MHz)	Maximum Reading (dBμV) @3m	Table Angle Degree	Antenna Height (cm)	Detector PK/QP/Ave.	Correction Factor			Corrected Amplitude (dBμV/m) @3m	Corrected Amplitude (dBμA/m) @3m	EN 300 330 Limit		Margin (dB)
					Ant. Factor (dB)	Cable Loss (dB)	Pre- Amp. Gain (dB)			(dBμA/m) @10m	(dBμA/m) @3m	
0.081	35.4	125	150	QP	68.22	0.06	28	75.68	24.18	-4.01	27.29	3.11
27.62	23.89	90	150	QP	34.32	0.13	28	30.34	-21.16	-25	-9.49	11.67

Note1: According to ETSI EN 300 330 V2.1.1 (2017-02), for measuring equipment calibrated in dBμV/m, the reading should be reduced by 51.5 dB to converted to dBμA/m.

Note2: that the tested distance between EUT and receiver, is 3 meters and according to annex H and these calculations shall be stated in the test report. The calculated Limit at 3 m distance as, $H_3\text{ m} = H_{10\text{ m}} + C_3$; ($C_3 = 31.3$ for 0.081MHz, $C_3 = 15.51$ for 27.62MHz).

Note3: The EUT was measured at a distance of 3m.

Note4: For the H-field limit in dBμA/m at 3 m, please refer to EN 300 330 annex H.

30 MHz-1GHz:

Frequency (MHz)	Maximum Reading (dBμV) @3m	Turn Table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN300330	
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)		Limit (dBm)	Margin (dB)
64.57	50.70	181	150	V	-54.97	0.28	-10.09	-65.34	-57	8.34
87.61	50.86	54	150	V	-53.07	0.31	-7.17	-60.55	-57	3.55
189.78	47.22	234	150	V	-56.96	0.41	-4.40	-61.77	-57	4.77
199.93	45.41	32	150	V	-59.67	0.42	-3.95	-64.04	-57	7.04
227.88	46.34	107	150	V	-61.31	0.43	-3.00	-64.74	-57	7.74
693.71	39.56	132	150	V	-60.09	0.62	-1.68	-62.39	-57	5.39

Note 1: The unit of antenna gain is dBd for frequency below 1GHz .

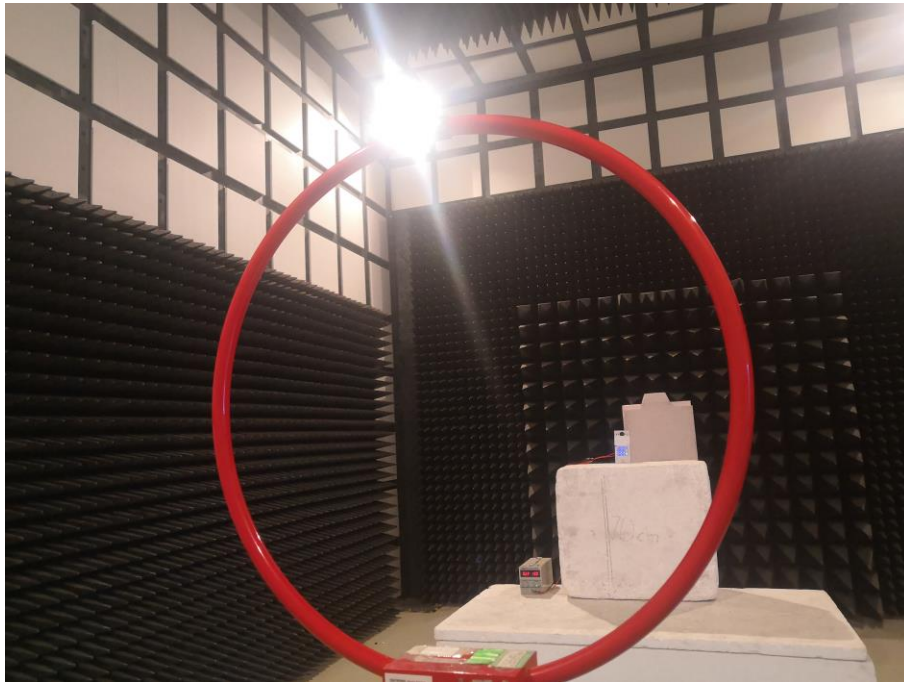
Note 2: Absolute Level = Submitted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

EXHIBIT A - EUT PHOTOGRAPHS

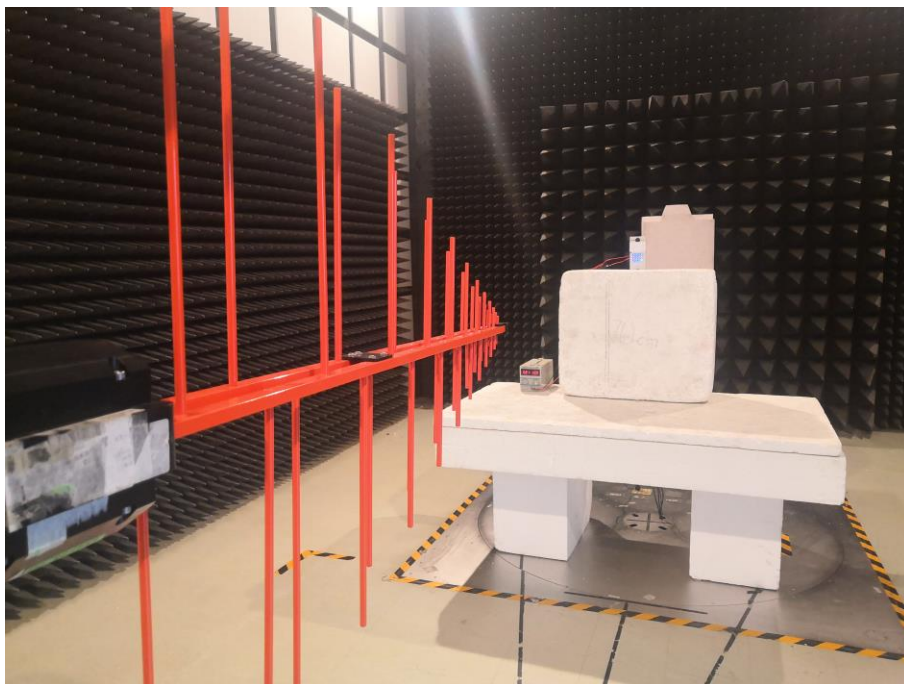
Refer to report NO. RXM220104050-01B

EXHIBIT B - TEST SETUP PHOTOGRAPHS

Radiated Emissions View (Below 30 MHz)



Radiated Emissions View (Above 30 MHz)



Declarations

- 1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
- 2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
- 3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
- 4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*******END OF REPORT*******