

SPECTRUM REPORT

Applicant: Shenzhen Huafurui Technology Co., Ltd.

Address of Applicant: Unit 1401 &1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P.R. China

Equipment Under Test (EUT)

Product Name: Smartphone

Model No.: C20

Trade mark: CUBOT

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

Date of sample receipt: 17 Aug., 2020

Date of Test: 17 Aug., to 22 Sep., 2020

Date of report issued: 23 Sep., 2020

Test Result : PASS *

*In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.



Bruce Zhang

Laboratory Manager



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

2 Version

Version No.	Date	Description
00	23 Sep., 2020	Original

Prepared by: Mike Ou
Test Engineer

Date: 23 Sep., 2020

Reviewed by: Winner Zhang
Project Engineer

Date: 23 Sep., 2020

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4 Test Summary

Radio Spectrum Matter (RSM) Part of Transmitter				
Test item	Test Requirement	Test method	Limit/Severity	Result
Operating frequency ranges	EN 300 330 section 4.3.2	EN 300 330 section 6.2.2	Table 1	PASS
Modulation bandwidth	EN 300 330 section 4.3.3	EN 300 330 section 6.2.3	EN 300 330 section 4.3.3.3	PASS
Transmitter H-field requirements	EN 300 330 section 4.3.4	EN 300 330 section 6.2.4	Table 2	PASS
Transmitter RF carrier current	EN 300 330 section 4.3.5	EN 300 330 section 6.2.5	Table 3	N/A
Transmitter radiated E-field	EN 300 330 section 4.3.6	EN 300 330 section 6.2.6	EN 300 330 section 4.3.6.3	N/A
Transmitter conducted spurious emissions	EN 300 330 section 4.3.7	EN 300 330 section 6.2.7	EN 300 330 section 4.3.7.3	N/A
Transmitter radiated spurious domain emission limits < 30 MHz	EN 300 330 section 4.3.8	EN 300 330 section 6.2.8	Table 5	PASS
Transmitter radiated spurious domain emission limits > 30 MHz	EN 300 330 section 4.3.9	EN 300 330 section 6.2.9	Table 6	PASS
Transmitter Frequency stability	EN 300 330 section 4.3.10	EN 300 330 section 6.2.10	EN 300 330 section 4.3.10.3	N/A
Radio Spectrum Matter (RSM) Part of Receiver				
Receiver spurious emissions	EN 300 330 section 4.4.2	EN 300 330 section 6.3.1	Table 8	PASS
Adjacent channel selectivity	EN 300 330 section 4.4.3	EN 300 330 section 6.3.2	Table 9	N/A
Receiver blocking or desensitization	EN 300 330 section 4.4.4	EN 300 330 section 6.3.3	Table 10	N/A
Remark: <ol style="list-style-type: none"> 1. Pass: The EUT complies with the essential requirements in the standard. 2. N/A: Indicates that the test was not applicable. 3. Temperature (Uncertainty): $\pm 1^{\circ}\text{C}$, Humidity (Uncertainty): $\pm 5\%$. 4. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer). 				

5 General Information

5.1 Client Information

Applicant:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 1401 &1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P.R. China
Manufacturer/Factory:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 1401 &1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P.R. China

5.2 General Description of E.U.T.

Product Name:	Smartphone
Model No.:	C20
Hardware version:	V956_MB_V2.0_20200427
Software version:	CUBOT_C20_A025C_V01_20200731
Operation Frequency:	13.56MHz
Modulation type:	ASK
Power supply:	Rechargeable Li-ion Battery DC3.85V/4200mAh
AC adapter:	Model No.:HJ-0502000W2-EU Input: AC100-240V, 50/60Hz 0.3A Output: DC 5.0V, 2.0A

5.3 Test environment and mode, and test samples plans

Transmitting mode:	Keep the NFC in transmitting mode with modulation.
Receiving mode:	Keep the NFC in receiving mode.
Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -20℃ ~ +55℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 3.85Vdc, Extreme: Low 3.5Vdc, High 4.4Vdc

5.4 Description of Support Units

The EUT was test as an independent unit

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
RF frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	± 1 dB
RF power, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
Radiated Emission (9kHz ~ 30MHz)	± 3.12 dB
Radiated Emission (30MHz ~ 1000MHz)	± 4.32 dB
Radiated Emission (1GHz ~ 18GHz)	± 5.16 dB

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.7 Laboratory Location

Shenzhen ZhongjianNanfang Testing Co.,Ltd.

Address: No.110~116, Building B, Jinyuan Business Building, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755-23118282, Fax:+86-755-23116366

Email: info@ccis-cb.com, Website: <http://www.ccis-cb.com>

5.8 Test Instruments list

Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2020	07-21-2021
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-07-2020	03-06-2021
Biconical Antenna	SCHWARZBECK	VUBA9117	359	06-22-2020	06-21-2021
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-07-2020	03-06-2021
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2020	06-21-2021
Loop Antenna	SCHWARZBECK	FMZB 1519 B	00044	03-07-2020	03-06-2021
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2020	03-06-2021
Pre-amplifier	CD	PAP-1G18	11804	03-07-2020	03-06-2021
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-05-2020	03-04-2021
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-05-2020	03-04-2021
Signal Generator	Rohde & Schwarz	SMX	835454/016	03-05-2020	03-04-2021
Signal Generator	R&S	SMR20	1008100050	03-05-2020	03-04-2021
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2020	03-06-2021
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2020	03-06-2021
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2020	03-06-2021

6 Radio Technical Requirements Specification in ETSI EN 300 330

6.1 Transmitter Requirement

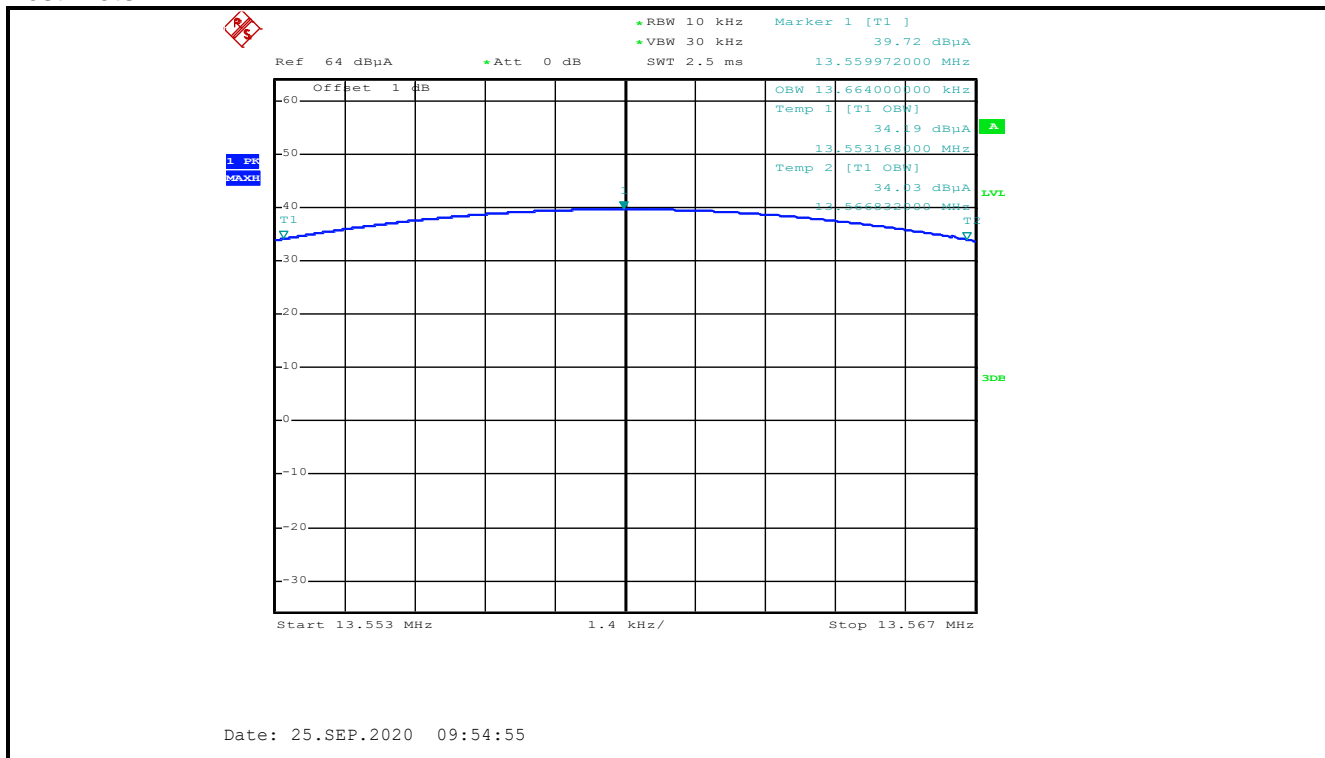
6.1.1 Operating frequency ranges

Test Requirement:	EN 300 330 clause 4.3.2																								
Test Method:	EN 300 330 clause 6.2.2																								
Receiver Setup:	<table><tr><th colspan="4">Table 11</th></tr><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 KHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr><tr><td colspan="4">NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</td></tr></table>	Table 11				Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz	NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.			
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Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth																						
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30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz																						
NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.																									
Limit:	The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table 1.																								
Test Frequency:	13.56MHz																								
Test Setup:	<div><div><div>Input from Test Fixture</div><div>Measuring Receiver</div><div>Data Store</div></div><p>Figure 1: Test set-up for measurement of the operating frequencies</p></div>																								
Test Procedure:	<p>The measurement antenna shall be placed at one point of the setup up. Alternatively, a current probe could be used.</p> <p>A spectrum analyser with the following settings is used as measuring receiver in the test set-up:</p> <ul style="list-style-type: none">• 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: ≥ Resolution Bandwidth.• Detector mode: RMS.• Display mode: Max hold. <p>The 99 % OBW function shall be used to determine the operating frequency range:</p> <ul style="list-style-type: none">• 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. $f_c = \frac{f_H + f_L}{2}$ <p>Alternatively, the recorded results from the H-field measurement described in clause 6.2.4 may be used.</p>																								
Test Instruments:	Refer to section 5.8 for details																								
Test Mode:	Refer to section 5.3 for details																								
Test Results:	Passed																								

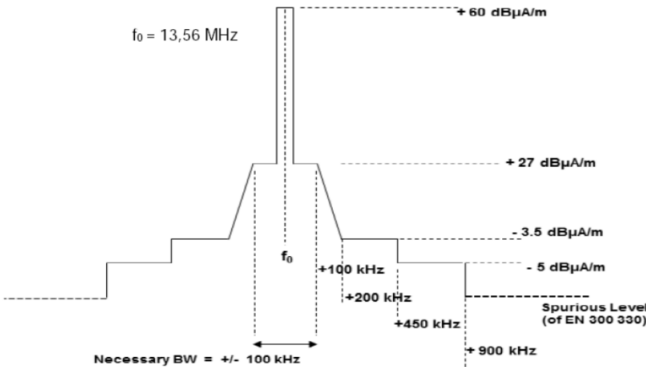
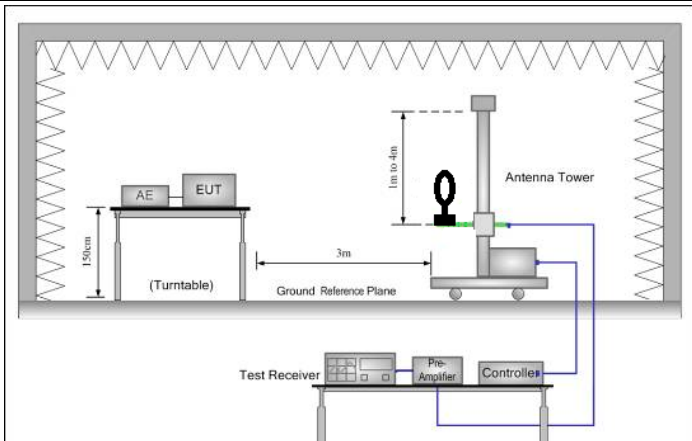
Measured data:

Test conditions		Frequency (MHz)	99% OBW (KHz)	f_L (MHz)	f_H (MHz)	Limit (MHz)	Result
Volt(dc)	Temp						
3.85V	25°C	13.56	13.664	13.553168	13.566832	13.553 < f_L and f_H < 13.567	Pass
3.50V	55°C	13.56	13.661	13.553170	13.566831		
3.50V	-20°C	13.56	13.662	13.553169	13.566831		
4.40V	55°C	13.56	13.660	13.553170	13.566830		
4.40V	-20°C	13.56	13.663	13.553168	15.566831		

Test Plots:



6.1.2 Modulation bandwidth

Test Requirement:	EN 300 330 clause 4.3.3																
Test Method:	EN 300 330 clause 6.2.3																
Receiver Setup:	<div>Table 11</div> <table><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 kHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr></table> <div>NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</div>	Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 kHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz
Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth														
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz														
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 kHz														
30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz														
Limit:	<p>The modulation bandwidth shall be within the assigned frequency band see table 1 or ±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.</p>  <p style="text-align: center;">Figure I.4: Spectrum mask limit for narrowband RFIDs (incl. NFC application) in the 13,56 MHz range</p>																
Test Frequency:	13.56MHz																
Test Setup:																	
Test Procedure:	<p>The measurements shall be made on an open field test site as specified in annex C. Any measured values shall be at least 6 dB above the ambient noise level.</p> <p>The H-field is measured with a shielded loop antenna connected to a measurement receiver.</p> <p>The measuring bandwidth and detector type of the measurement receiver shall be in accordance with clause 5.12.</p>																
Test Instruments:	Refer to section 5.8 for details																
Test Mode:	Refer to section 5.3 for details																
Test Results:	Passed																
Remark:	We used 3m Anechoic chamber to test, and the measured value at 3m distance is extrapolated to 10m in the report.																

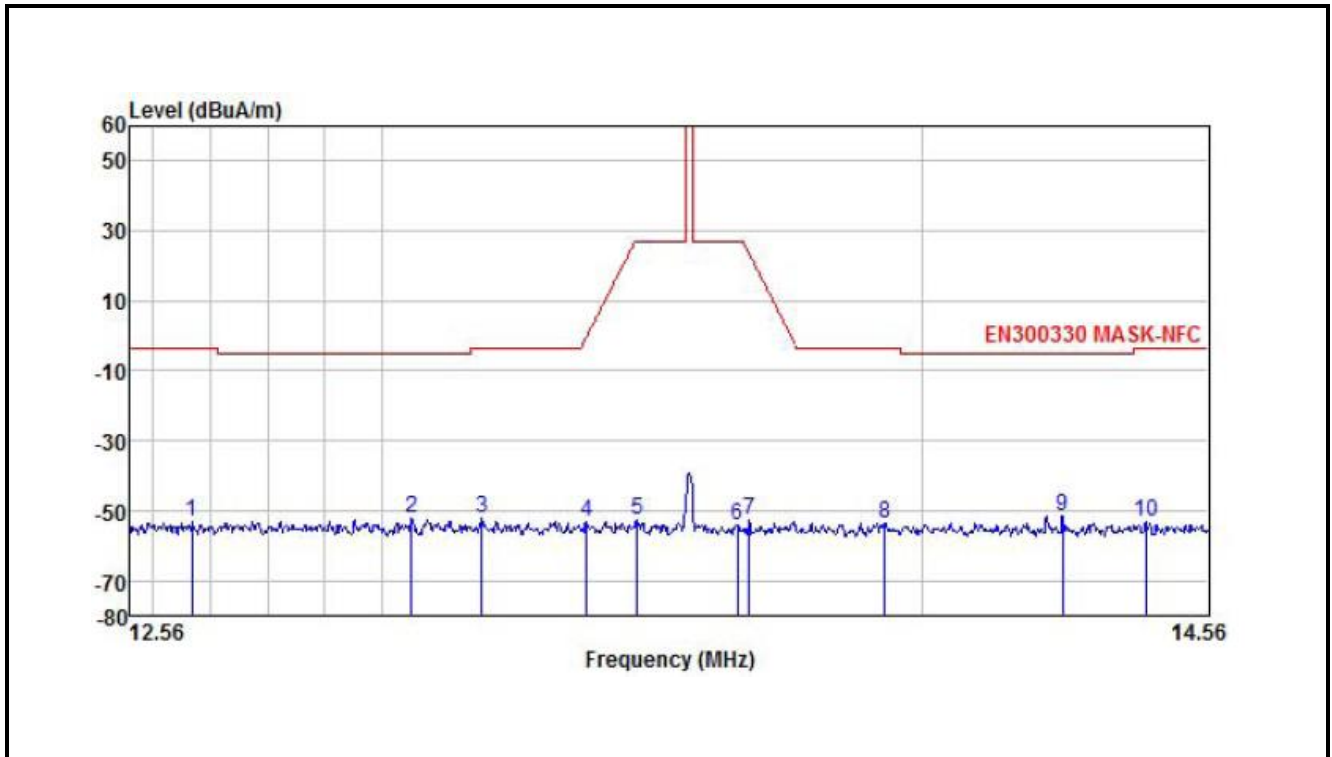
Measured data:

Frequency (MHz)	H-field @3m (dBμA/m)	Conversion factor (dB)	H-field @10m (dBμA/m)	Limit@10 (dBμA/m)	Result
12.666	-53.32	23.45	-76.77	-3.50	Pass
13.054	-52.27	23.38	-75.65	-5.00	
13.180	-52.13	23.35	-75.48	-3.50	
13.370	-53.11	23.33	-76.44	-0.42	
13.463	-52.84	23.32	-76.16	27.00	
13.650	-54.19	23.16	-77.35	27.00	
13.672	-52.87	23.15	-76.02	23.47	
13.929	-53.46	23.05	-76.51	-3.50	
14.272	-51.37	22.90	-74.27	-5.00	
14.436	-53.17	22.80	-75.97	-3.50	

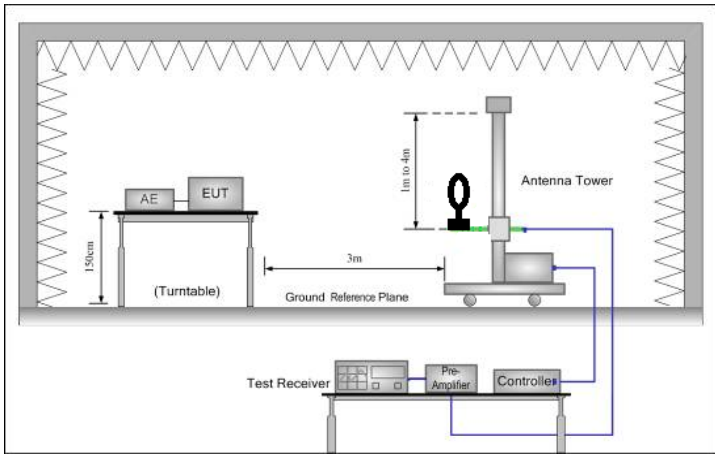
Remark:

According to EN 300 330, $H_{3m} = H_{10m} + C3$, where, $C3$ is a conversion factor in dB determined from figure H.2.

Test Plots:



6.1.3 Transmitter H-field requirements

Test Requirement:	EN 300 330 clause 4.3.4																				
Test Method:	EN 300 330 clause 6.2.4																				
Receiver Setup:	<table><tr><th colspan="4">Table 11</th></tr><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 KHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr></table> <p>NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</p>	Table 11				Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz
Table 11																					
Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth																		
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz																		
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz																		
30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz																		
Limit at 10m Distance:	60 dBμA/m at 10 m																				
Test Frequency:	13.56MHz																				
Test Setup:																					
Test Procedure:	<p>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.</p> <p>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.</p> <p>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.</p> <p>The equipment under test shall operate where possible, with modulation. Where this is not possible, it shall be stated in the test report.</p> <p>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.</p> <p>For measuring equipment calibrated in dBμV/m, the reading should be reduced by 51.5 dB to be converted to dBμA/m.</p>																				
Test Instruments:	Refer to section 5.8 for details																				
Test Mode:	Refer to section 5.3 for details																				
Test Results:	Passed																				
Remark:	Used 3m Anechoic chamber to test, and the measured value at 3m distance is extrapolated to 10m in the report.																				

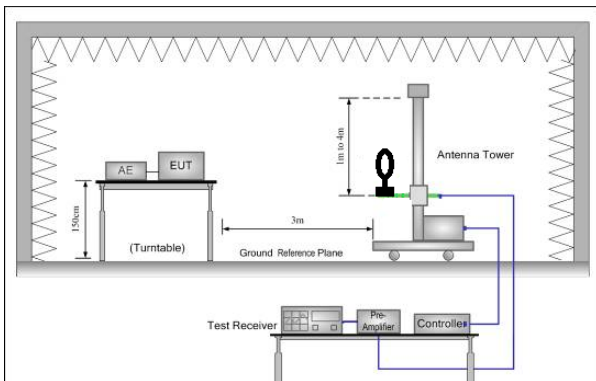
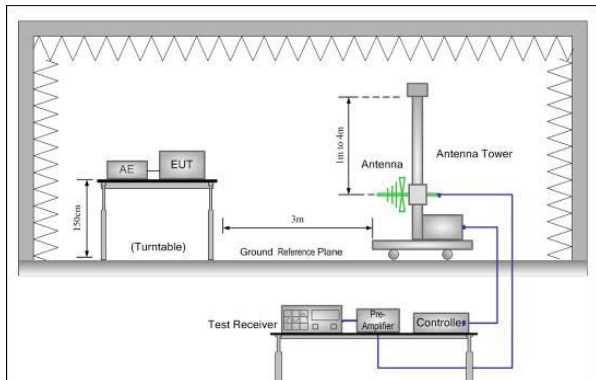
Measured data:

Test conditions		Frequency (MHz)	H-field@3m (dBμA/m)	Conversion factor (dB)	H-field@10m (dBμA/m)	Limit@10 (dBμA/m)	Result
Volt(DC)	Temp						
3.85V	25℃	13.56	-36.19	23.20	-59.39	60	Pass
3.50V	55℃	13.56	-36.24	23.20	-59.44		
3.50V	-20℃	13.56	-36.23	23.20	-59.43		
4.40V	55℃	13.56	-36.21	23.20	-59.41		
4.40V	-20℃	13.56	-36.35	23.20	-59.55		

Remark:

According to EN 300 330, $H_{3m} = H_{10m} + C_3$, where, C_3 is a conversion factor in dB determined from figure H.2.

6.1.4 Radiated spurious emissions

Test Requirement:	EN 300 330 clause 4.3.8 and clause 4.3.9																		
Test Method:	EN 300 330 clause 6.2.8 and clause 6.2.9																		
Receiver Setup:	<div>Table 11</div> <table><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 KHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr></table> <div>NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</div>	Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz		
Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth																
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz																
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz																
30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz																
Limit at 10m Distance:	<div>Below 30MHz:</div> <div>Table 5</div> <table><tr><th>State</th><th>Frequency 9 kHz ≤ f < 10 MHz</th><th>Frequency 10 MHz ≤ f < 30 MHz</th></tr><tr><td>Operating</td><td>27 dBμA/m at 9 kHz descending 3 dB/oct</td><td>-3,5 dBμA/m</td></tr><tr><td>Standby</td><td>5,5 dBμA/m at 9 kHz descending 3 dB/oct</td><td>-25 dBμA/m</td></tr></table> <div>Above 30MHz:</div> <div>Table 6</div> <table><tr><th>State</th><th>47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz</th><th>Other frequencies between 30 MHz to 1 000 MHz</th></tr><tr><td>Operating</td><td>4 nW</td><td>250 nW</td></tr><tr><td>Standby</td><td>2 nW</td><td>2 nW</td></tr></table>	State	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz	Operating	27 dBμA/m at 9 kHz descending 3 dB/oct	-3,5 dBμA/m	Standby	5,5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m	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
State	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz																	
Operating	27 dBμA/m at 9 kHz descending 3 dB/oct	-3,5 dBμA/m																	
Standby	5,5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m																	
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																	
Test Frequency Range:	9 kHz to 1GHz																		
Test Setup:	<div>Below 30MHz</div> <div></div> <div>30MHz-1GHz</div> <div></div>																		
Test Procedure:	<div>Substitution method was performed to determine the actual ERP emission levels of the EUT.</div> <div>The following test procedure as below:</div> <div>Below 30MHz test procedure:</div> <div>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.</div> <div>For Product Class 3 the transmitter antenna connector of the equipment</div>																		

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.

Above 30MHz test procedure:

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.

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 Instruments:	Refer to section 5.8 for details
Test Mode:	Refer to section 5.3 for details
Test Results:	Passed
Remark:	Used 3mAnechoic chamber to test, and the measured value at 3m distance is extrapolated to 10m.

Measurement Data:

Test Frequency range: 9k~30MHz					
Frequency (MHz)	Level@3m (dBμA/m)	Conversion Factor (dB)	Level@10m (dBμA/m)	Limit@10m (dBμA/m)	Result
0.016	-26.20	31.20	-57.40	24.62	PASS
0.031	-31.94	31.20	-63.14	21.62	
0.325	-44.87	31.20	-76.07	11.42	
0.672	-48.00	31.20	-79.20	8.26	

Test Frequency range: 30MHz~1000MHz				
Frequency (MHz)	Level (dBm)	Limit(dBm)	Polarization	Result
52.03	-71.34	-54.00	Vertical	PASS
107.13	-74.78	-54.00	Vertical	
32.52	-61.26	-36.00	Vertical	
165.49	-69.71	-36.00	Vertical	
108.65	-74.96	-54.00	Horizontal	
179.39	-68.83	-54.00	Horizontal	
165.49	-70.36	-36.00	Horizontal	
438.66	-71.47	-36.00	Horizontal	

Remark:

The standby mode is to lower than the limit, so not show in this report.

According to EN 300 330, $H_{3m} = H_{10m} + C_3$, where, C_3 is a conversion factor in dB determined from figure H.2.

6.1.5 Transmitter Frequency stability

Test Requirement:	EN 300 330 clause 4.3.10																								
Test Method:	EN 300 330 clause 6.2.10																								
Receiver Setup:	<table><tr><th colspan="4">Table 11</th></tr><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 KHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr><tr><td colspan="4">NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</td></tr></table>	Table 11				Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz	NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.			
Table 11																									
Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth																						
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz																						
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz																						
30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz																						
NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.																									
Limit:	The equipment shall either: a) remain in the Operating Channel without exceeding any applicable limits (e.g. Duty Cycle); or b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or c) shut down, (e.g. no emission above EMC levels).																								
Test Procedure:	Step 1: Operation of the EUT shall be started, on Operating Frequency as declared by the manufacturer, with the appropriate test signal and with the EUT operating at nominal operating voltage. The centre frequency of the transmitted signal shall be measured and noted. Step 2: The operating voltage shall be reduced by appropriate steps until the voltage reaches zero. The centre frequency of the transmitted signal shall be measured and noted. Any abnormal behaviour shall be noted.																								
Test Instruments:	Refer to section 5.8 for details																								
Test Mode:	See remark below																								
Test Results:	Passed																								
Remark:	EUT is a label system, not applicable for channelized systems																								

6.2 Receiver Conformance requirements

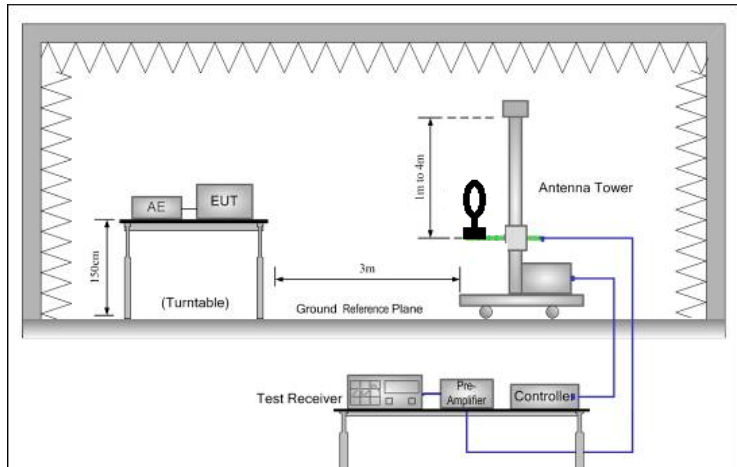
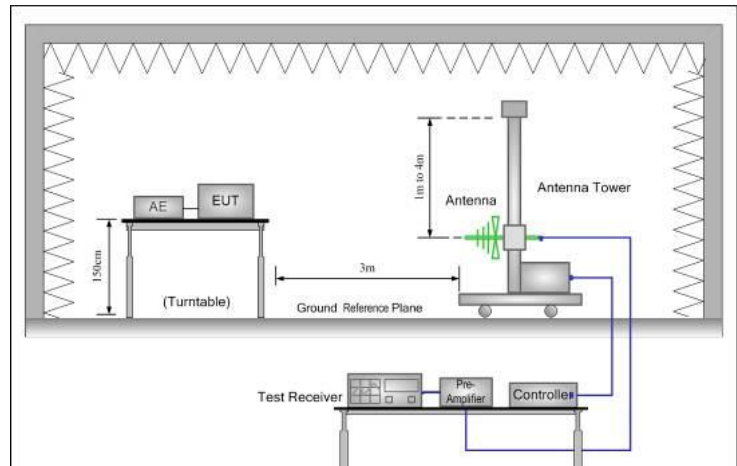
6.2.1 Receiver spurious emissions

Table 7

Technologies	Receiver spurious emission (clause 4.4.2)	Adjacent channel selectivity (clause 4.4.3)	Blocking or desensitization (clause 4.4.4)
tagging systems	yes	no (note 2)	no (note 1)
systems in the 27 MHz range	yes	Yes	yes
all others	yes	no (note 2)	yes
NOTE 1: Blocking or desensitization not needed because of the physical co-location of RX to TX in tagging systems where the RX and TX operate simultaneously. The TX signal is used for the RX baseband mixing. The TX signal at the RX input is about 90 dB above the receiver sensitivity or tagging signal level the receiver (see ETSI TR 103 059 [i.9], figure 8). Furthermore given the very short communication ranges for most applications (e.g. NFC, RFID), a given interference blocking signal will have to be about 90 dB higher as the transmitter signal at the transceiver antenna, which is unlikely to happen.			
NOTE 2: This requirement can only be required where a frequency plan with standard channel spacing is consistently used, for example in the 27 MHz band.			

Remark: The EUT is a tagging systems.

6.2.2 Receiver spurious emissions

Test Requirement:	EN 300 330 clause 4.4.2																
Test Method:	EN 300 330 clause 6.3.1																
Receiver Setup:	<div>Table 11</div> <table><tr><th>Frequency: (f)</th><th>Detector type</th><th>Measurement receiver bandwidth</th><th>Spectrum analyser bandwidth</th></tr><tr><td>9 kHz ≤ f < 150 kHz</td><td>Quasi Peak</td><td>200 Hz</td><td>300 Hz</td></tr><tr><td>150 kHz ≤ f < 30 MHz</td><td>Quasi Peak</td><td>9 kHz</td><td>10 KHz</td></tr><tr><td>30 MHz ≤ f ≤ 1 000 MHz</td><td>Quasi Peak</td><td>120 kHz</td><td>100 kHz</td></tr></table> <div>NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.</div>	Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth	9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz	150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 KHz	30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz
Frequency: (f)	Detector type	Measurement receiver bandwidth	Spectrum analyser bandwidth														
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz														
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30 MHz ≤ f ≤ 1 000 MHz	Quasi Peak	120 kHz	100 kHz														
Limit at 10m Distance:	<div>Below 30MHz:</div> <div>Table 8: Receiver spurious radiation limits</div> <table><tr><th>Frequency 9 kHz ≤ f < 10 MHz</th><th>Frequency 10 MHz ≤ f < 30 MHz</th></tr><tr><td>5,5 dBμA/m at 9 kHz descending 3 dB/oct</td><td>-25 dBμA/m</td></tr></table> <div>Above 30MHz:</div> <div>The spurious components above 30 MHz measured values shall not exceed 2 nW</div>	Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz	5,5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m												
Frequency 9 kHz ≤ f < 10 MHz	Frequency 10 MHz ≤ f < 30 MHz																
5,5 dBμA/m at 9 kHz descending 3 dB/oct	-25 dBμA/m																
Test Frequency Range:	9 kHz to 1GHz																
Test Setup:	<div>Below 30MHz</div> <div></div> <div>Above 1GHz</div> <div></div>																
Test Procedure:	<div>Substitution method was performed to determine the actual ERP emission levels of the EUT.</div> <div>The following test procedure as below:</div> <div>Below 30MHz test procedure:</div> <div>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</div>																

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.

Above 30MHz test procedure:

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.

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

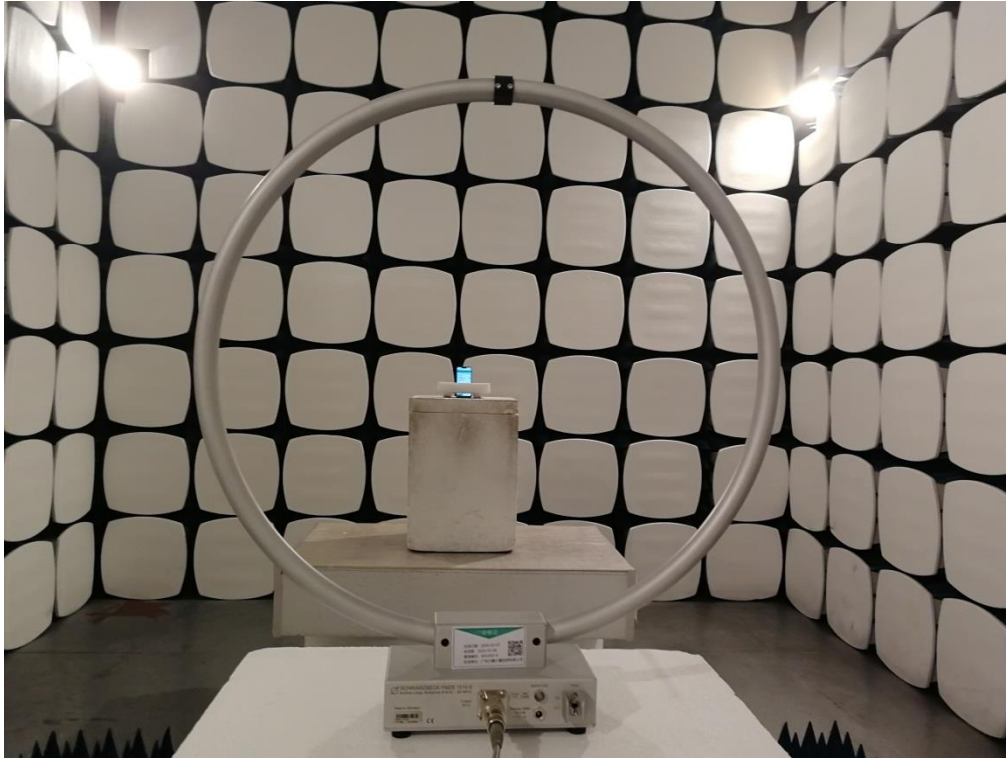
	(see clause 5.8.2) in which case this fact shall be recorded in the test report. If standby mode is available, the measurements shall be repeated in that mode.
Test Instruments:	Refer to section 5.8 for details
Test Mode:	Refer to section 5.3 for details
Test Results:	Passed
Remark:	We used 3mAnechoic chamber to test, and the measured value at 3m distance is extrapolated to 10m.

Measured data:

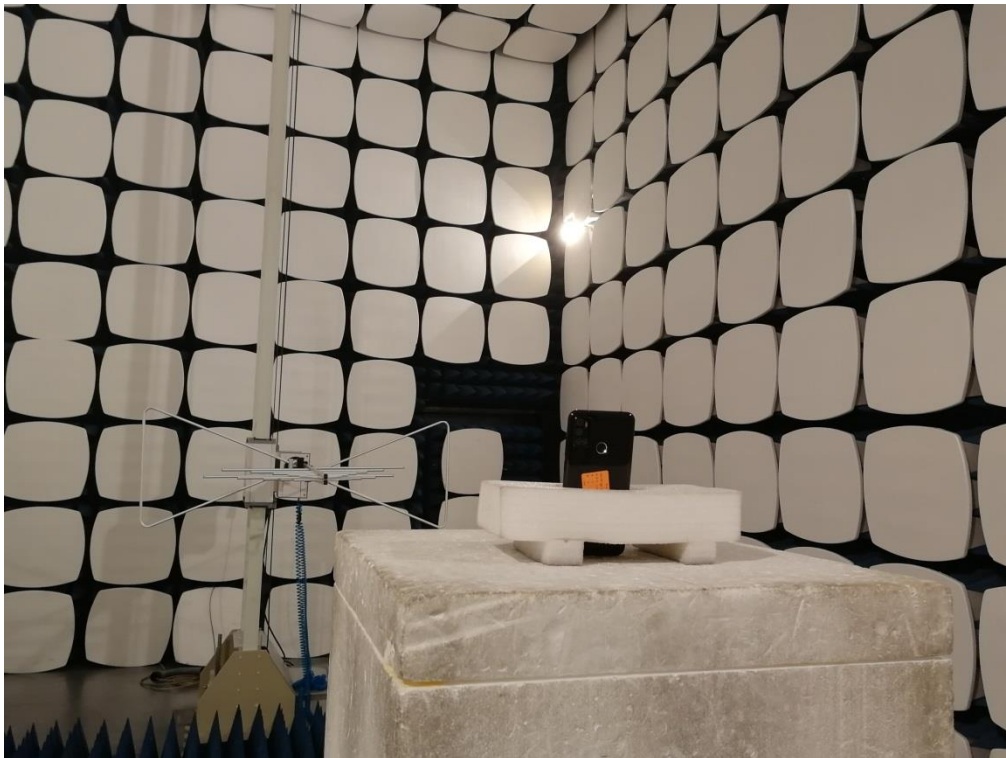
Frequency (MHz)	Level (dBm)	Limit (dBm)	Polarization	Result
32.41	Vertical	-61.46	Vertical	PASS
137.90	V	-70.56	Vertical	
179.39	Horizontal	-71.62	Horizontal	
432.55	H	-71.96	Horizontal	
Remark: The test data of receiver mode below 30MHz is too lower than the limit, so not show in this report.				

7 Test Setup Photo

9 kHz-30 MHz



30 MHz-1 GHz



8 EUT Constructional Details

Reference to the test report No. CCISE200804401

----- End of report -----