





Prüfbericht-Nr.: CN212BVU (P15C-NFC) Auftrags-Nr.: 238494114 Seite 1 von 25 Order no .: Page 1 of 25 001 Test report no.: Kunden-Referenz-Nr.: N/A Auftragsdatum: 2020-11-12 Order date: Client reference no.: Auftraggeber: AURES TECHNOLOGIES S.A. Client: 24 bis rue Léonard de Vinci 91090 Lisses FRANCE Prüfgegenstand: 7" Integrated Handy POS Test item: Bezeichnung / Typ-Nr.: TMC7200 Identification / Type no.: Auftrags-Inhalt: FCC Part 15C Test report (NFC) Order content: Prüfgrundlage: Test specification: FCC 47CFR Part 15: Subpart C Section 15.225 Wareneingangsdatum: 2021-08-04 Date of sample receipt: Prüfmuster-Nr.: A003104126-001 Test sample no: Prüfzeitraum: 2021-08-19 - 2021-09-01 Testing period: Ort der Prüfung: **EMC/RF** Taipei Testing Place of testing: Prüflaboratorium: Taipei Testing Laboratories Testing laboratory: Prüfergebnis*: Pass Test result*: überprüft von: genehmigt von: compiled by: authorized by: Beerla CL Ausstellungsdatum: Datum: Date: 2021-09-08 Issue date: 2021-09-08 Rvan Chen Brenda Chen Senior Project Manager **Stellung** / Position: Stellung / Position: Senior Project Manager Sonstiges / Other: Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt Condition of the test item at delivery: Test item complete and undamaged * Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet 2 = good3 = satisfactory 4 = sufficient 5 = poor* Legend: 1 = very good P(ass) = passed a.m. test specification(s) N/A = not applicable F(ail) = failed a.m. test specification(s) N/T = not testedDieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be



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TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.203	Antenna Requirement	Pass
5.1.2	15.225 (a)(b)(c)	Field Strength of Fundamental Emissions	Pass
5.1.3	15.225 (d)	Radiated Spurious Emissions	Pass
5.1.4	15.225 (e)	Frequency Stability	Pass
5.1.5	15.215 (c)	20 dB Bandwidth	Pass
5.1.5	2.1049	99% Occupied Bandwidth	Pass
5.2.1	15.207	Mains Conducted Emission	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.



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APPENDIX SP - PHOTOGRAPHS OF TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

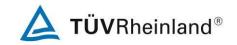


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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued	
CN212BVU (P15C-NFC) 001	Original Release	2021-09-08	



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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Radiated Emissions & Mains Conducted Emission

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio

FCC 47CFR Part 15: Subpart C Section 15.225 FCC 47CFR Part 2: Subpart J Section 2.1049 ANSI C63.10:2013

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.



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2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist. Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,

New Taipei City 244 Taiwan (R.O.C.)

FCC Registration No.: 226631 ISED Registration No.: 25563



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2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of k=2 to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Mains Conducted Emission	± 1.65 dB



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3. General Product Information

3.1 Product Function and Intended Use

The EUT is a 7" Integrated Handy POS working at 13.56 MHz with NFC function. For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information	
Kind of Equipment/Test Item	7" Integrated Handy POS	
Type Identification	TMC7200	
FCC ID	2AUQF-NFC300	

Technical Specification of EUT

Item	EUT information
Operating Frequency	13.56 MHz
Operation Voltage	3.85 Vdc
Modulation	ASK
Antenna Information	Refer to 5.1.1
Accessory Device	Refer to 4.3



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3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description



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4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: The EUT's NFC reader is permanently opened. While the sensor card is approaching NFC reader, it continuously transmits. While the sensor card is removed, it continuously receives.

The samples were used as follows:

A003104126-001

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To				
	Radiated Spurious Emissions	Frequency Stability	20 dB Bandwidth	Mains Conducted Emission	Description
-	V	V	V	V	-

Note:

- 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on Y-plane.
- 2. "-" means no effect.

Radiated Spurious Emissions

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	
-	13.56	13.56	

Frequency Stability

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	
-	13.56	13.56	

20 dB Bandwidth

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	
-	13.56	13.56	



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Mains Conducted Emission

Pre-Scan full test was applied on all test modes, but only worst case was shown.

Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Frequency (MHz)	Tested Frequency (MHz)	
-	13.56	13.56	

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Radiated Spurious Emissions	20.5-23.3 °C	59.3-63.1 %	Simon Tsai
Frequency Stability	24.7 °C	45 %	Stanislas Charles
20 dB Bandwidth	24.7 °C	45 %	Stanislas Charles
Mains Conducted Emission	21.9 °C	59 %	Simon Tsai

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

No.	Product	Brand	Model	Description
А	Adapter	TUE		I/P: 100-240 Vac, 1000 mA O/P: 12 Vdc, 2000 A 150cm non-shielded cable w/o core
В	Charger	AURES	TMC7000-Charger	
-	Battery	APACK TECHNOLOGY CO., LTD.	APP00272	3.85 Vdc, 7400 mAh

Support Unit

	Support Unit								
Ν	No. Description Brand Model S/N Remark								
	1	NFC Card	TUV	TUV-065	N/A				

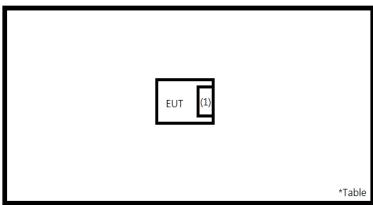


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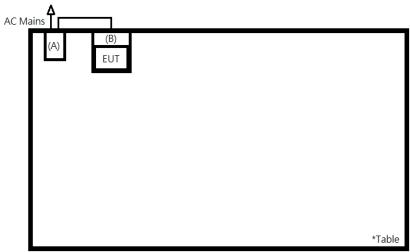
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4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>



<Mains Conducted Emission mode>





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5. Test Results

Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

The antenna is a loop antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision. Refer to EUT photo for details.



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5.1.2 Field Strength of Fundamental Emissions

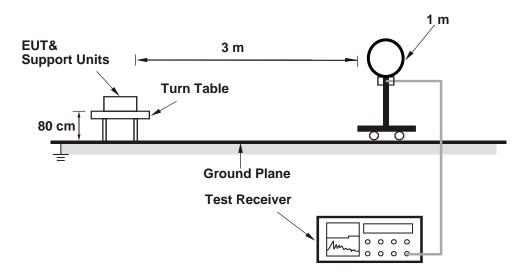
Limit

- a. The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- b. Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- c. Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

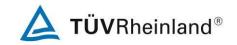
Kind of Test Site

3m Semi-Anechoic Chamber

Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).



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Test Instruments

Kind of Equipment	Manufacturer	Туре	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101508	2021/3/16	2022/3/15
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2021/2/18	2022/2/17
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/1	2021/11/30
LF-AMP	Agilent	8447D	2944A10772	2021/2/18	2022/2/17
HF-AMP + AC source	EMCI	EMC051845SE	980633	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15
Loop Antenna	Chance Most	EMCILPA600 +calibration	287	2021/1/15	2022/1/14



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Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) Level (dBuV/m) = Reading (dBuV) + Factor (dB/m) Limit at 30m = 15848 (uV/m) **Limit at 3m = 20*log(15848)+40log(30m/3m) (dBuV/m) = 84+40 (dBuV/m) = 124 (dBuV/m)

Please refer to Appendix A.



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5.1.3 Radiated Spurious Emissions

Limit

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209 as below table:

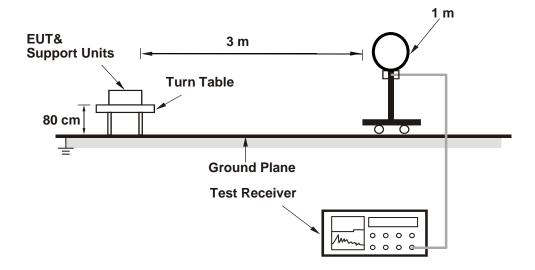
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Kind of Test Site

3m Semi-Anechoic Chamber

Test Setup

<Radiated Emissions below 30 MHz>



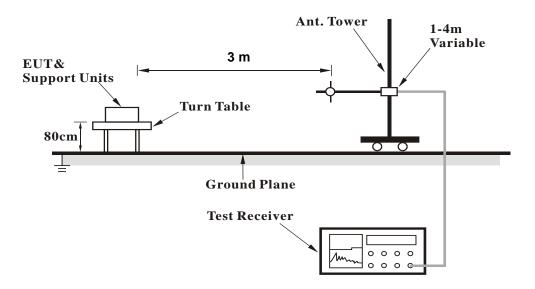


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<Radiated Emissions 30 MHz to 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Please refer to 5.1.2 Instruments



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Test Procedures

For Radiated Emissions below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
- 2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
- 2. All modes of operation were investigated and the worst-case emissions are reported.
- 3. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.



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5.1.4 Frequency Stability

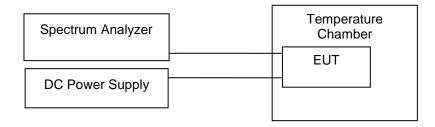
Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01 % of the operating frequency over a temperature variation of -20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C.

Kind of Test Site

Shielded room

Test Setup



Test Instruments

Kind of	Manufacturar Tura		S/N	Calibration	Calibration	Test Date	
Equipment	Manufacturer	Туре	3/IN	Date	Due Date	From	Until
Spectrum Analyzer	R&S	FSV40	101512	2021/1/29	2022/1/28	2021/8/26	2021/8/26

Test Procedures

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turned the EUT on and coupled its output to a spectrum analyzer.
- c. Turned the EUT off and set the chamber to the highest temperature specified.
- d. Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.
- e. Repeated step b and c with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85 % to 115 % and the frequency record.



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Test Result

Frequency (MHz)		13.56								
Condition		Test Time				Frequency Error (ppm)				
Extreme	Modulation Mode	0 min	2 min	5 min	10 min	0 min	2 min	5 min	10 min	
T _{20°C} V _{max}	CW	13.56035	13.56035	13.56035	13.56035	25.59	25.59	25.59	25.59	
T _{20°C} V _{min}	CW	13.56035	13.56035	13.56035	13.56035	25.59	25.59	25.59	25.59	
T _{50°C} V _{nom}	CW	13.56028	13.56028	13.56028	13.56028	20.28	20.28	20.28	20.28	
T _{40°C} V _{nom}	CW	13.56029	13.56029	13.56029	13.56029	21.31	21.31	21.31	21.31	
T _{30°C} V _{nom}	CW	13.56032	13.56032	13.56032	13.56032	23.45	23.45	23.45	23.45	
T _{20°C} V _{nom}	CW	13.56035	13.56035	13.56035	13.56035	25.59	25.59	25.59	25.59	
T _{10°C} V _{nom}	CW	13.56036	13.56036	13.56036	13.56036	26.70	26.70	26.70	26.70	
$T_{0^{\circ}C}V_{nom}$	CW	13.56038	13.56038	13.56038	13.56038	27.73	27.73	27.73	27.73	
T-10°CVnom	CW	13.56036	13.56036	13.56036	13.56036	26.70	26.70	26.70	26.70	
T _{-20°C} V _{nom}	CW	13.56036	13.56035	13.56035	13.56033	26.70	25.59	25.59	24.56	
Limit (ppm)		- 100								
Re	sult		Pass							



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5.1.5 20 dB Bandwidth and 99% Occupied Bandwidth

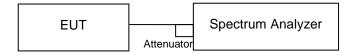
Limit

The 20 dB bandwidth shall be specified in operating frequency band.

Kind of Test Site

Shielded room

Test Setup



Test Instruments

Kind of	Manufacturer	Manufacturer Type S/N		Calibration Calibration		Test Date		
Equipment		Туре	3/IN	Date	Due Date	From	Until	
Spectrum Analyzer	R&S	FSV40	101512	2021/1/29	2022/1/28	2021/8/26	2021/8/26	

Test Procedure

<20 dB Bandwidth>

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1 kHz RBW and 3 kHz VBW. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

<99% Occupied Bandwidth>

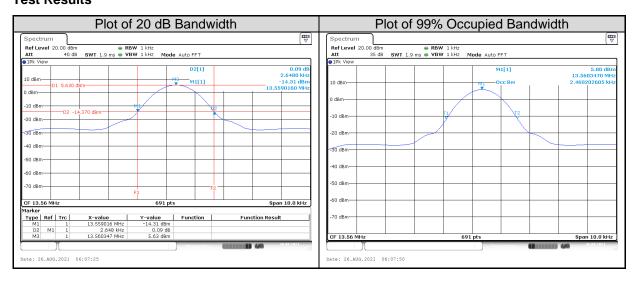
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1 % to 5 % of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to Sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.



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Test Results





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5.2 Mains Emission

5.2.1 Mains Conducted Emission

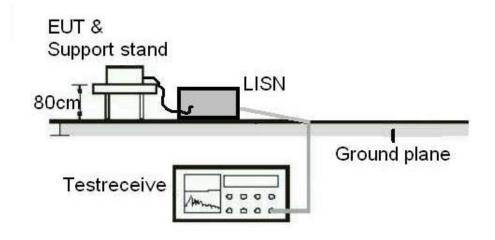
Limit

Mains Conducted emissions as defined in §15.207 must comply with the mains conducted emission limits.

Kind of Test Site

Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Туре	S/N	Calibration Date	Calibration Due Date
TWO-LINE V- NETWORK	R&S	ENV216	1816064	2020/9/10	2021/9/9
EMI Test Receiver	R&S	ESCI	1816063	2020/11/17	2021/11/16
RF Cable	N/A	N/A	EMC-003	2020/11/15	2021/11/14



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Test Procedures

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

Test Results

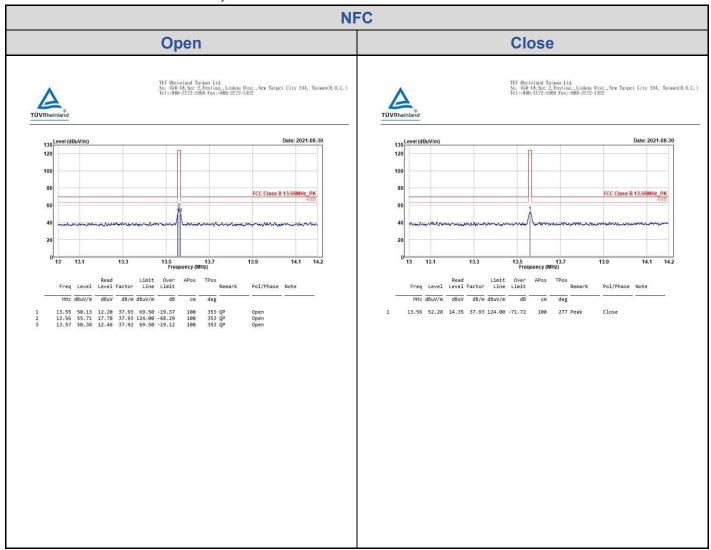
Please refer to Appendix A.

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Appendix A: Test Results of Radiated Spurious Emissions & Mains

Conducted Emission

Fundamental Emissions, 13.553MHz ~ 13.567MHz

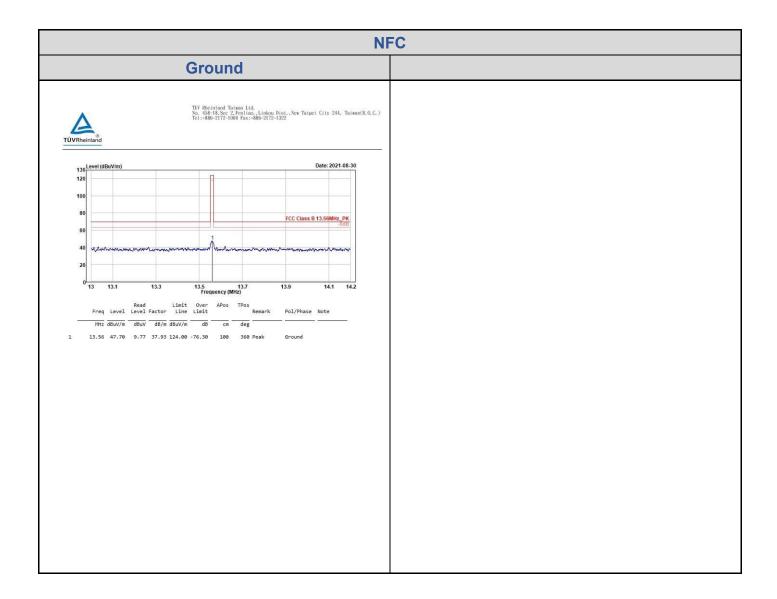


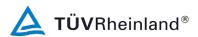


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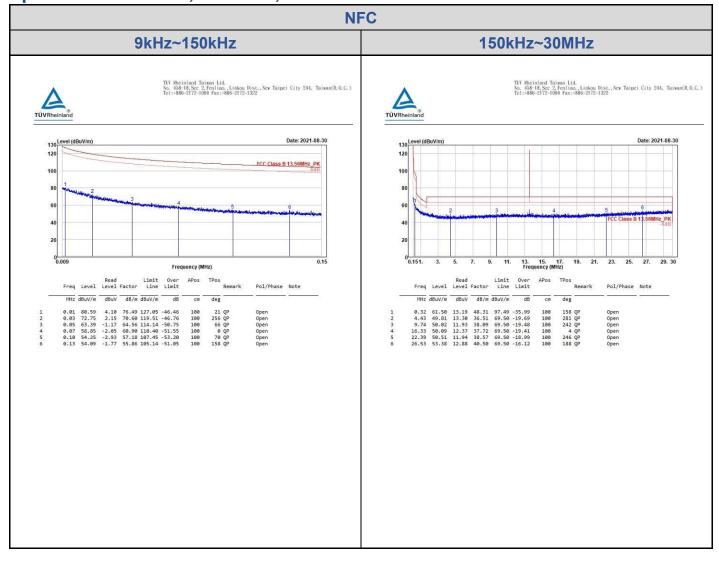
Prüfbericht - Nr.:

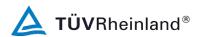
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Spurious Emissions, Tx Mode, 9kHz ~ 30MHz





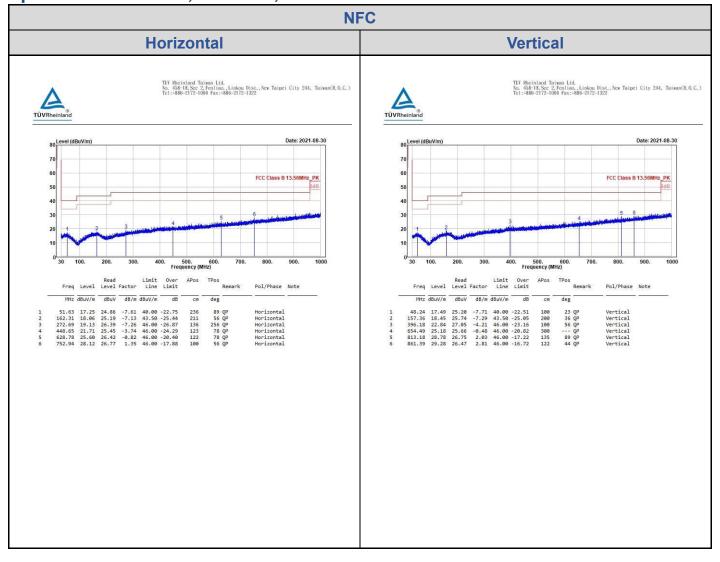
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Spurious Emissions, Tx Mode, 30MHz ~ 1GHz





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Mains Conducted Emission, (150kHz ~ 30MHz)

