

Prüfbericht-Nr.: Test report no.:	CN24CKF4 001	Auftrags-Nr.: Order no.:	180307448	Seite 1 von 25 Page 1 of 25
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2024.10.12	
Auftraggeber: Client:	Turnils North America 1750 Satellite Blvd, Suite 100, Buford GA 30518			
Prüfgegenstand: Test item:	DC Tubular Motor with rechargeable battery			
Bezeichnung / Typ-Nr.: Identification / Type no.:	AMP28B-2/28			
Auftrags-Inhalt: Order content:	TÜV Rheinland – FCC & ISSED Service			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15.203 FCC 47 CFR Part 15.231 FCC Part 15, Subpart B:2023		RSS-210 Issue 11 RSS-Gen Issue 5 ICES-003 Issue 7:2020	
Wareneingangsdatum: Date of sample receipt:	2024.10.28	Refer to Photo Documentation		
Prüfmuster-Nr.: Test sample no:	A003852620-001			
Prüfzeitraum: Testing period:	2024.11.04 - 2024.11.18			
Ort der Prüfung: Place of testing:	Refer to section 1.1			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	genehmigt von: authorized by:			
Datum: Date:	2025.01.14		Ausstelldatum: Issue date: 2025.01.14	
Stellung / Position:	Keda Zhou/PE		Stellung / Position: Chonghai Liang/Authorizer	
Sonstiges / Other:	FCC ID: 2AU29AMP28BV5 ISED: 25624-AMP28BV5			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
Dieser 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 duplicated in extracts. This test report does not entitle to carry any test mark.				

Prüfbericht-Nr.: CN24CKF4 001
Test report no.:

Seite 2 von 25
Page 2 of 25

Anmerkungen Remarks

Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.

Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.

The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.

Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.

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Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.

*Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.*

Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.

Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.

The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.

Prüfbericht - Nr.: CN24CKF4 001
Test Report No.:

Seite 3 von 25
Page 3 of 25

Test Summary

4.1.1 ANTENNA REQUIREMENT

Result:

Pass

4.1.2 DEACTIVATION OF THE TRANSMISSION

Result:

Pass

4.1.3 20DB EMISSION BANDWIDTH

Result:

Pass

4.1.4 99% BANDWIDTH MEASUREMENT

Result:

Pass

4.1.5 FIELD STRENGTH OF FUNDAMENTAL AND UNWANTED EMISSIONS

Result:

Pass

4.2.1 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Pass

4.2.2 RADIATED DISTURBANCE

Result:

Pass

Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 4 von 25

Page 4 of 25

Contents

1. TEST SITES	5
1.1 TEST FACILITIES.....	5
1.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
1.3 UNCERTAINTY OF MEASUREMENT	5
2. GENERAL PRODUCT INFORMATION.....	6
2.1 PRODUCT FUNCTION AND INTENDED USE	6
2.2 RATINGS AND SYSTEM DETAILS	6
2.3 INDEPENDENT OPERATION MODES	6
2.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS	6
2.5 SUBMITTED DOCUMENTS	6
3. TEST SET-UP AND OPERATION MODES	7
3.1 PRINCIPLE OF CONFIGURATION SELECTION	7
3.2 TEST OPERATION AND TEST SOFTWARE	7
3.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	7
3.4 COUNTERMEASURES TO ACHIEVE ERM COMPLIANCE.....	7
3.5 TEST SET-UP.....	8
4. TEST RESULTS	9
4.1 TRANSMITTER REQUIREMENT & TEST SUITES	9
4.1.1 Antenna Requirement.....	9
4.1.2 Deactivation of the Transmission	10
4.1.3 20dB Emission Bandwidth	12
4.1.4 99% Bandwidth Measurement	13
4.1.5 Field strength of fundamental and Unwanted Emissions.....	15
4.2 OTHER REQUIREMENT & TEST SUITES	19
4.2.1 Mains Terminal Continuous Disturbance Voltage.....	19
4.2.2 Radiated disturbance	22
5. LIST OF TABLES	25
6. LIST OF FIGURES	25

Prüfbericht - Nr.: CN24CKF4 001
Test Report No.:

Seite 5 von 25
Page 5 of 25

1. Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland /CCIC (Ningbo) Co., Ltd.

1st Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road, Zhenhai District, Ningbo 315200 P.R. China

FCC Designation Number: CN1237

FCC Test Firm Registration Number: 647754

IC Company Number: 24297

CAB identifier: CN0047

The used test equipment is in accordance with CISPR 16-1 series standards.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment, Laboratory

Kind of Equipment	Type	Serial No.	Last cal. date	Cal. due date
EMI test receiver	ESR3	102331	2024.10.23	2025.10.22
LISN	ENV216	102250	2024.10.23	2025.10.22
EMI test receiver	ESR7	101929	2024.10.23	2025.10.22
Spectrum analyzer	FSV40	101412	2024.10.23	2025.10.22
Bilog Antenna	CBL6112D	49033	2024.03.17	2027.03.16
Horn antenna	HF907	102653	2023.07.20	2026.07.19
Pre-amplifier	SCU-18F	180051	2024.10.23	2025.10.22

1.3 Uncertainty of Measurement

Table 2: Measurement Uncertainty

Test Item	Expanded Measurement Uncertainty (k=2)
Conducted Emission (9-150kHz)	3.70dB
Conducted Emission (150k-30MHz)	3.30dB
Radiated Emission (30-1000MHz)	4.39dB
Radiated Emission (1-18GHz)	4.67dB

2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is a DC Tubular Motor with rechargeable battery operating at 433.05 - 434.79MHz.

For more detail information, refer to the user's manual.

2.2 Ratings and System Details

Table 3: General Description of EUT

General Description of EUT	
FCC ID:	2AU29AMP28BV5
ISED:	25624-AMP28BV5
Input Voltage:	USB 5V
Protection Class:	Class III
Operating Temperature Range:	-10°C~50°C
Technical Specification of SRD (433MHz)	
Operating Frequency band:	433.05 - 434.79MHz
Modulation:	2GFSK
Antenna Type:	Wire Antenna
Antenna Gain:	0.5 dBi

2.3 Independent Operation Modes

There are some modes:

Mode A: Transmitting on Operating Frequency Band: 433.05 - 434.79MHz

Mode B: Normal working

Mode C: Charging

Refer to the user's manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for further information.

2.5 Submitted Documents

Circuit diagram, Schematics, PCB Layout, Label, User Manual etc.

3. Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

3.2 Test Operation and Test Software

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power was selected according to the instruction given by the manufacturer. The setting of the RF output power expected by the customer shall be fixed on the firmware of the final end product.

All testing were performed according to the procedures in ANSI C63.10: 2013.

Test Software EMC32 V10.30 was used in the radiated emission test.

More details refer to the related paragraph of this report.

3.3 Special Accessories and Auxiliary Equipment

Table 4: List of Auxiliary Equipment

Description	Manufacturer	Model No.
Adapter	HUIZHOU BYD	QC10EU

3.4 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Circuit Diagram. No additional measures were employed to achieve compliance.

3.5 Test set-up

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

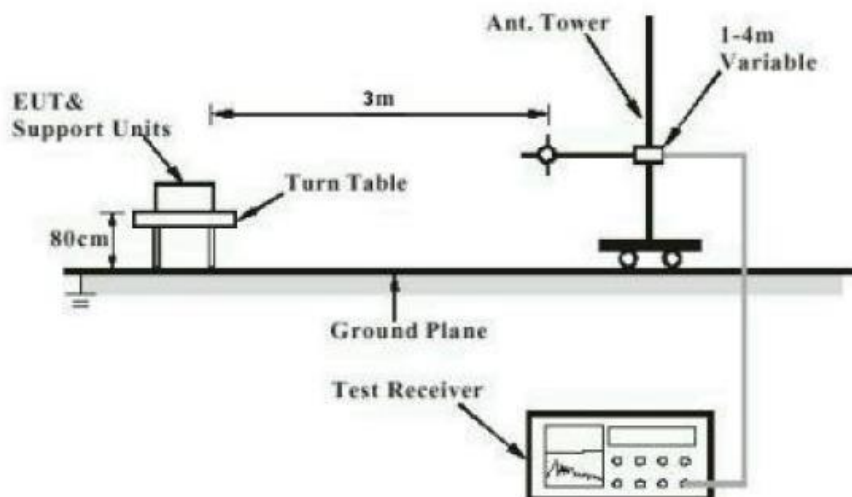


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

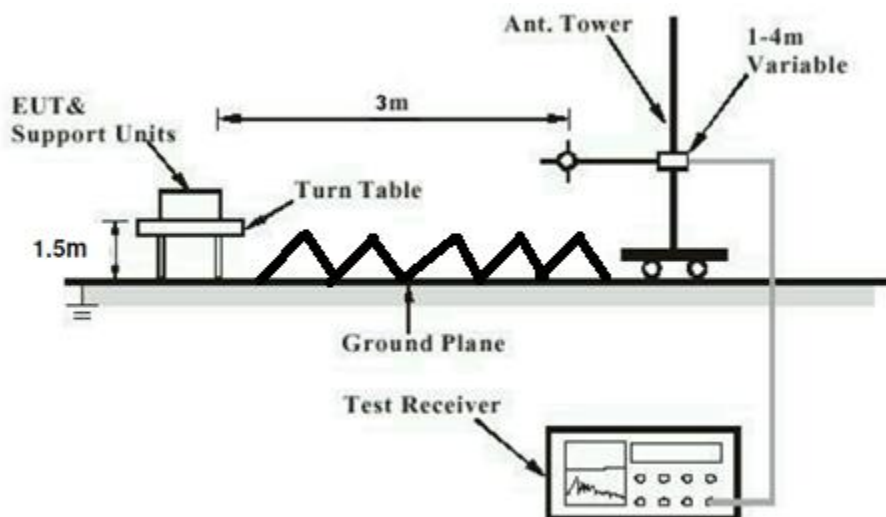
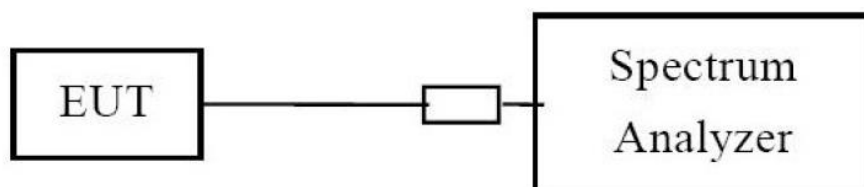


Diagram of Measurement Configuration for Conducted Transmitter Measurement



Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 9 von 25

Page 9 of 25

4. Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

Result:

Pass

Test Specification

Test standard

: FCC 47 CFR Part 15.203
RSS-Gen Issue 5

Limit

: FCC: the use of antennas with directional gains that do not exceed 6 dBi
RSS: Use of approved antennas only

According to the manufacturer declared, the EUT has a fixed external antenna (Wire antenna, Antenna Gain: 0.5dBi), and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore, the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 10 von 25

Page 10 of 25

4.1.2 Deactivation of the Transmission

Result:

Pass

Test Specification

Test standard : FCC 47 CFR Part 15.231
RSS-210 Issue 11

Basic standard : ANSI C63.10: 2013

Test requirement : CFR47 FCC Part 15.231 (a)(1)
RSS-210 Issue 11, Annex A.1.1

Limits : A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test suite : Shielded Room

Test Setup

Date of testing : 2024.11.18

Test environment: : Normal test conditions

Operational mode : Mode A

Temperature : 23°C

Relative humidity : 56%

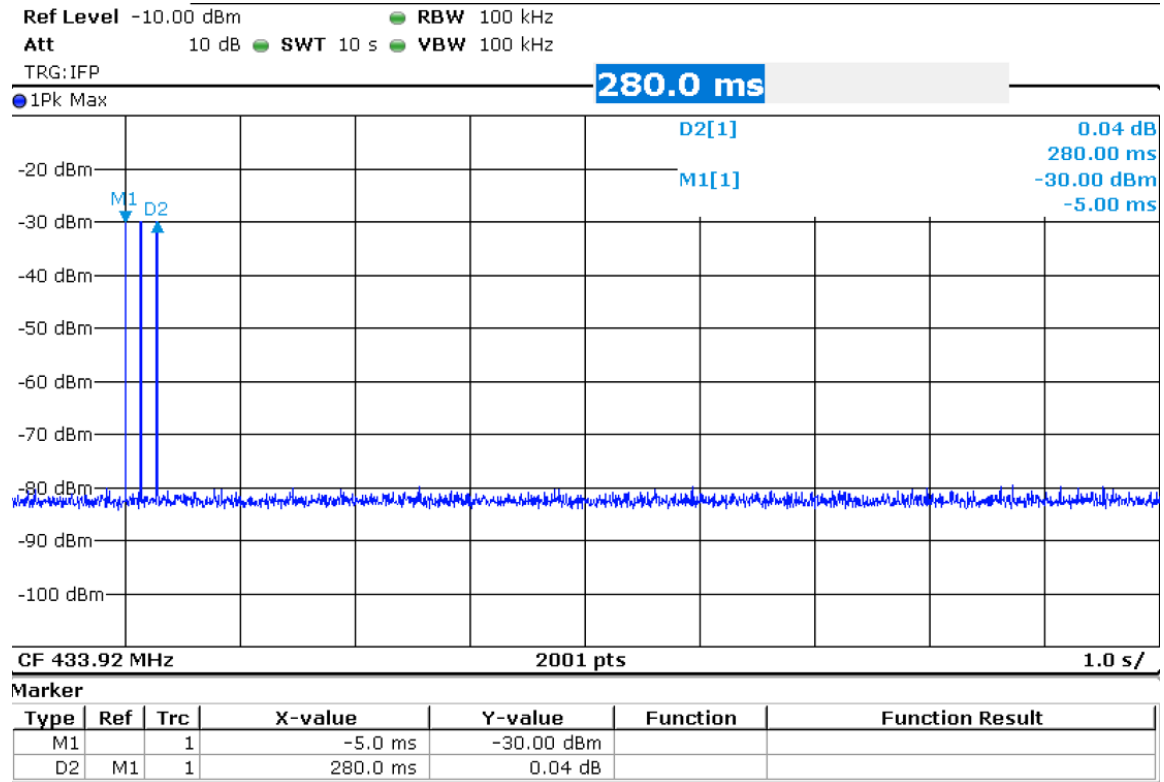
Atmospheric pressure : 101.2 kPa

Prüfbericht - Nr.: CN24CKF4 001
Test Report No.:

Seite 11 von 25
Page 11 of 25

Figure 1: Test Results of Deactivation of the Transmission

Activated mode Duration Time (S) Limit (S)
Manually 0.28 ≤5



4.1.3 20dB Emission Bandwidth

Result: Pass

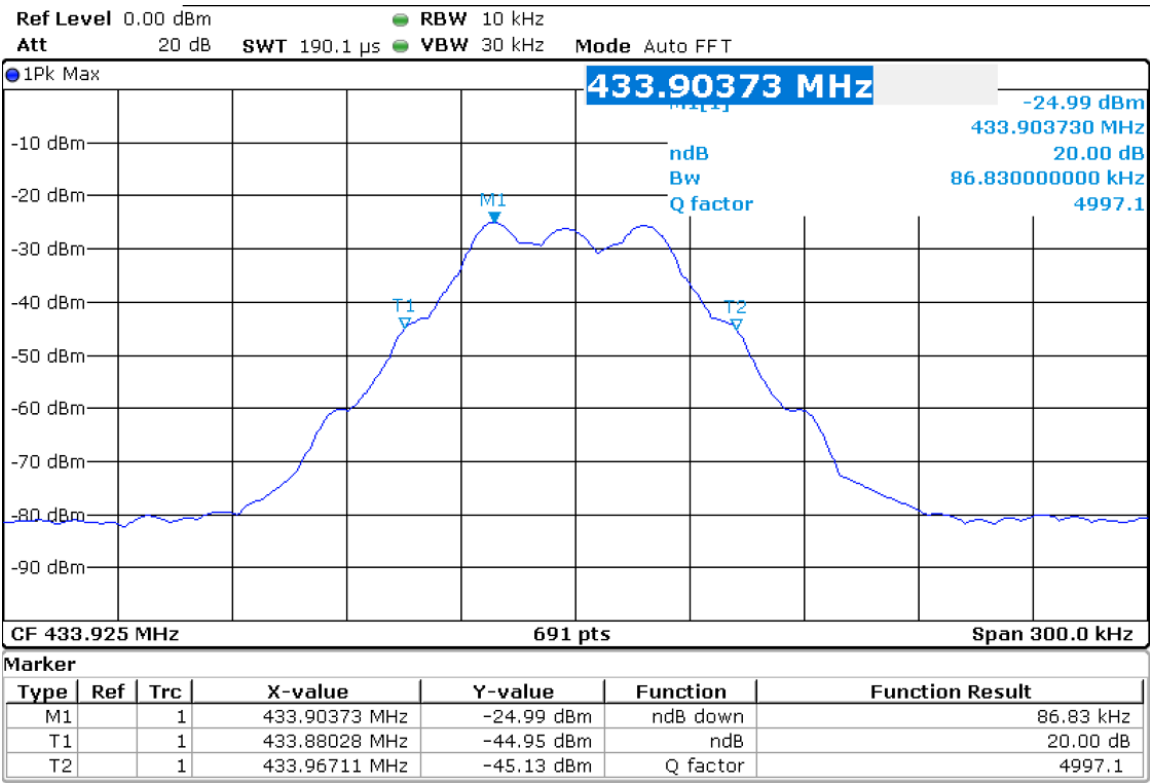
Test Specification	
Test standard	: FCC 47 CFR Part 15.231
Basic standard	: ANSI C63.10: 2013
Test requirement	: CFR47 FCC Part 15.231 (c)
Limit	: CFR47 FCC Part 15.231 (c)
Test suite	: Shielded Room

Test Setup

Date of testing	: 2024.11.18
Test environment	: Normal test conditions
Operational mode	: Mode A
Temperature	: 23°C
Relative humidity	: 56%
Atmospheric pressure	: 101.2 kPa

Figure 2: Test Results of 20dB Emission Bandwidth

Bandwidth (kHz) Limit (kHz)
 86.83 ≤1085



Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 13 von 25

Page 13 of 25

4.1.4 99% Bandwidth Measurement

Result:

Pass

Test Specification

Test standard : RSS-210 Issue 11

Basic standard : ANSI C63.10: 2013

Test requirement : RSS-210 Issue 11, Annex A.1.3

Limit : The occupied bandwidth of momentarily operated devices shall be less than or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the occupied bandwidth shall be less than or equal to 0.5% of the centre frequency.

Test suite : Shielded Room

Test Setup

Date of testing : 2024.11.18

Test environment : Normal test conditions

Operational mode : Mode A

Temperature : 23°C

Relative humidity : 56%

Atmospheric pressure : 101.2 kPa

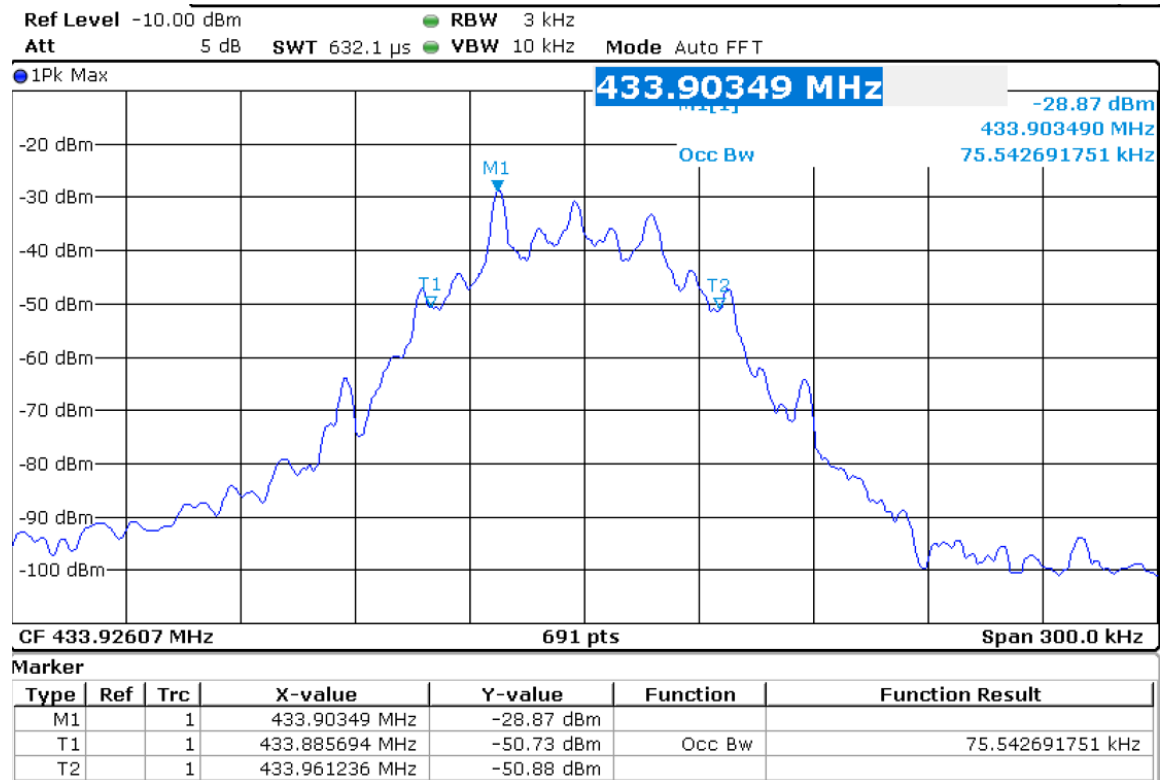
Prüfbericht - Nr.: CN24CKF4 001
Test Report No.:

Seite 14 von 25
Page 14 of 25

Figure 3: Test Results of 99% Bandwidth

Bandwidth (kHz)
75.54

Limit (kHz)
≤1085



Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 15 von 25

Page 15 of 25

4.1.5 Field strength of fundamental and Unwanted Emissions

Result:

Pass

Test Specification

Test standard

: FCC 47 CFR Part 15.231

CFR47 FCC Part 15.205

CFR47 FCC Part 15.209

RSS-210 Issue 11

RSS-Gen Issue 5

Basic standard

: ANSI C63.10: 2013

Test requirement

: CFR47 FCC Part 15.231 (b)(1)(2)(3)

RSS-210 Issue 11, Annex A.1.2

RSS-Gen Issue 5, Clause 8.10

Limits

: CFR47 FCC Part 15.231 (b)

RSS-210 Issue 11, Annex A.1.2

RSS-Gen Issue 5, Clause 8.9 & Clause 8.10

Test suite

: 3m Semi Anechoic Room

Test Setup

Date of testing

: 2024.11.04 - 2024.11.06

Test environment

: Normal test conditions

Operational mode

: Mode A

Temperature

: 21°C

Relative humidity

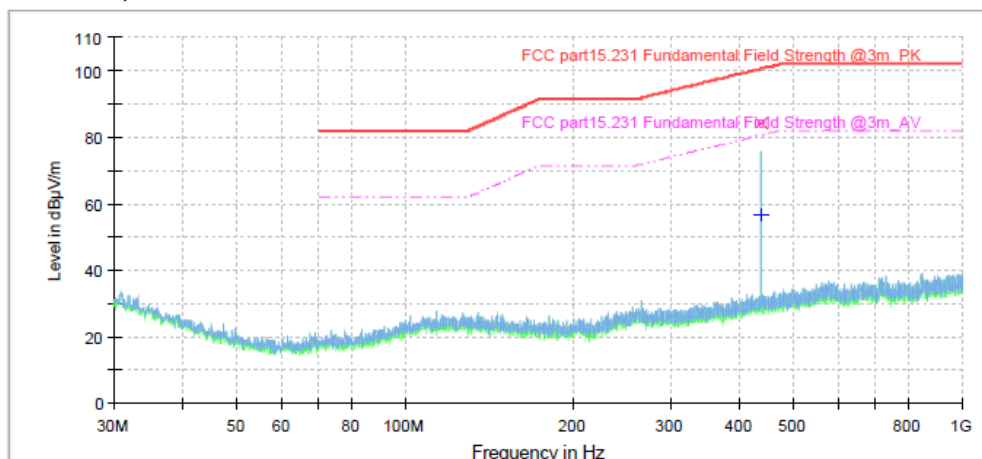
: 68%

Atmospheric pressure

: 101.2 kPa

Figure 4: Field strength of fundamental

Fundamental, Horizontal



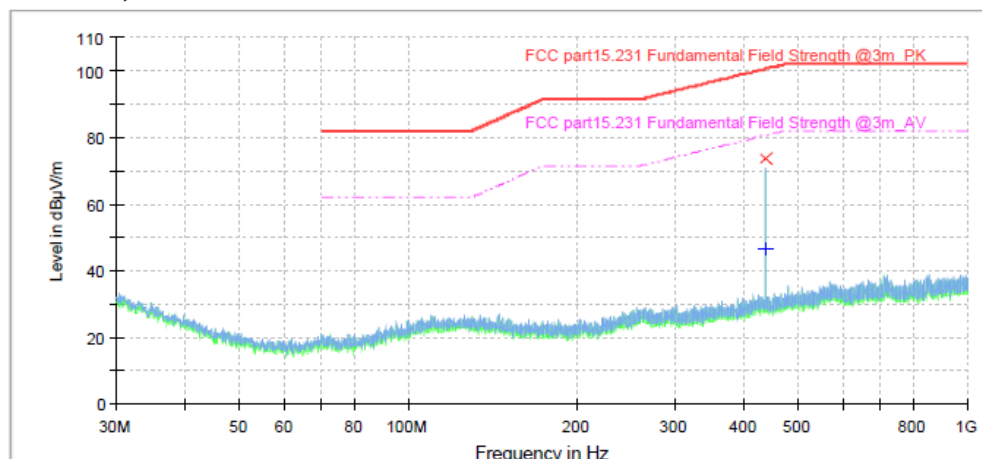
Limit and Margin-PK

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
433.950000	84.1	1000.0	120.000	200.0	H	0.0	24.2	16.5	100.6

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
433.950000	56.6	1000.0	120.000	200.0	H	0.0	24.2	24.0	80.6

Fundamental, Vertical



Limit and Margin-PK

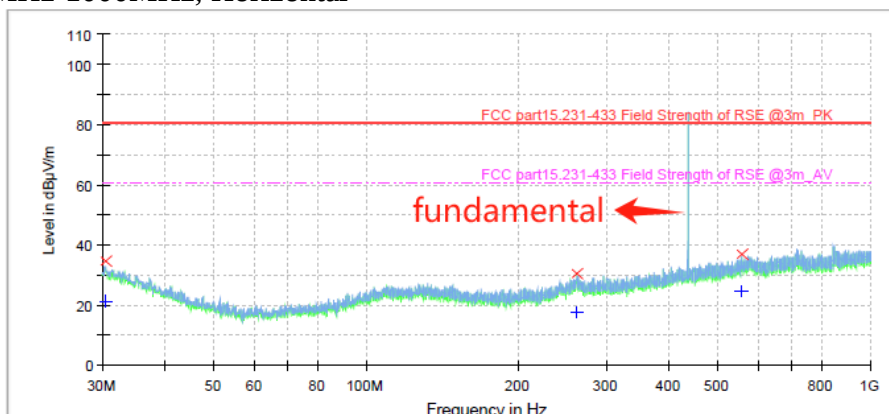
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
433.950000	73.9	1000.0	120.000	100.0	V	0.0	24.2	26.7	100.6

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
433.950000	46.7	1000.0	120.000	100.0	V	0.0	24.2	33.9	80.6

Figure 5: Spectral Diagrams, Radiated Spurious Emission

30MHz-1000MHz, Horizontal



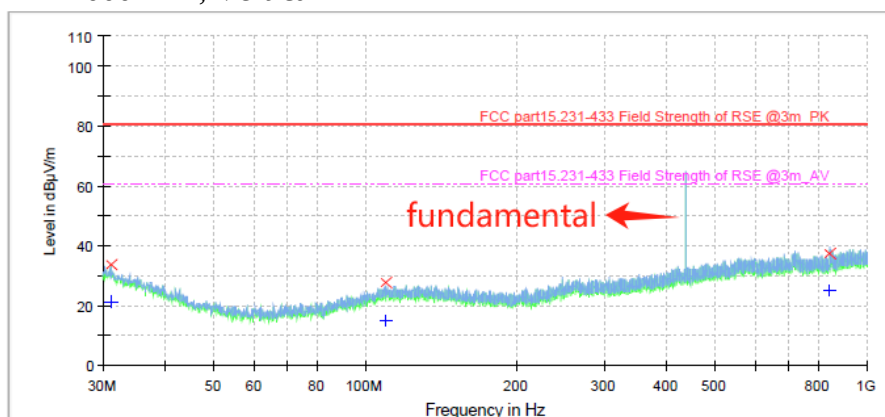
Limit and Margin-PK

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
30.380000	34.6	1000.0	120.000	100.0	H	0.0	25.2	46.0	80.6
262.530000	30.2	1000.0	120.000	100.0	H	0.0	21.0	50.4	80.6
556.220000	36.7	1000.0	120.000	100.0	H	0.0	27.1	43.9	80.6

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
30.380000	21.4	1000.0	120.000	100.0	H	0.0	25.2	39.2	60.6
262.530000	17.7	1000.0	120.000	100.0	H	0.0	21.0	42.9	60.6
556.220000	24.2	1000.0	120.000	100.0	H	0.0	27.1	36.4	60.6

30MHz-1000MHz, Vertical

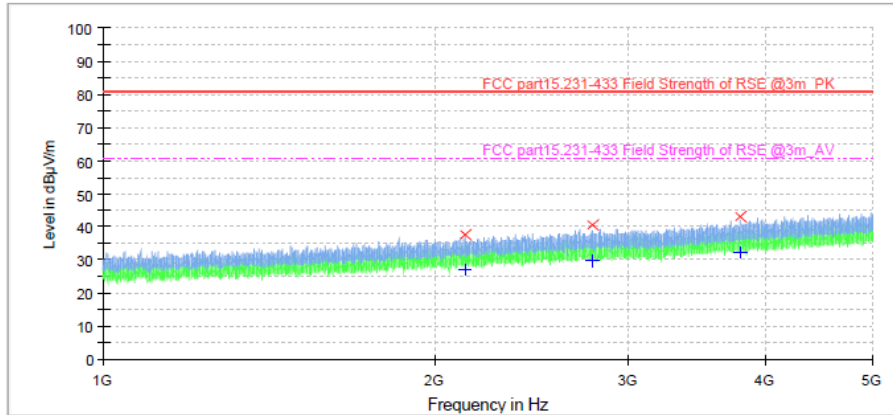


Limit and Margin-PK

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
31.020000	33.5	1000.0	120.000	100.0	V	0.0	24.9	47.1	80.6
109.760000	27.4	1000.0	120.000	100.0	V	0.0	18.6	53.2	80.6
844.800000	37.2	1000.0	120.000	100.0	V	0.0	28.4	43.4	80.6

Limit and Margin-AV

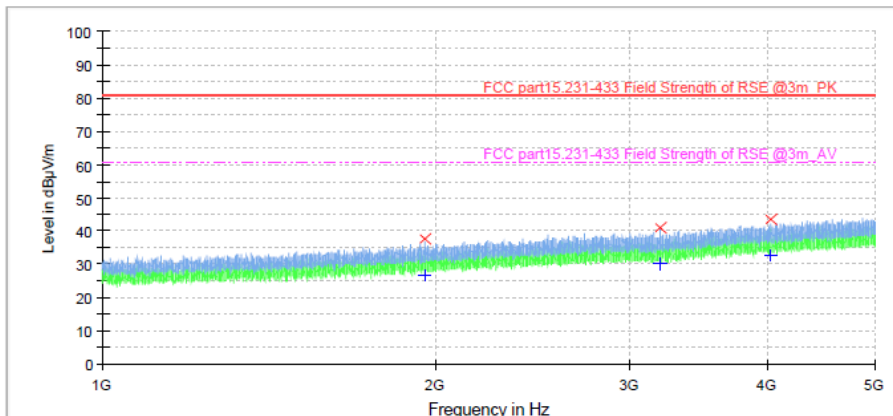
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
31.020000	21.0	1000.0	120.000	100.0	V	0.0	24.9	39.6	60.6
109.760000	14.9	1000.0	120.000	100.0	V	0.0	18.6	45.7	60.6
844.800000	25.0	1000.0	120.000	100.0	V	0.0	28.4	35.6	60.6

1GHz-5GHz, Horizontal

Limit and Margin-PK

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
2135.000000	37.8	1000.0	1000.000	150.0	H	0.0	-6.5	42.8	80.6
2784.000000	40.4	1000.0	1000.000	150.0	H	0.0	-2.7	40.2	80.6
3794.000000	43.3	1000.0	1000.000	150.0	H	0.0	1.3	37.3	80.6

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
2135.000000	27.0	1000.0	1000.000	150.0	H	0.0	-6.5	33.6	60.6
2784.000000	29.8	1000.0	1000.000	150.0	H	0.0	-2.7	30.8	60.6
3794.000000	32.2	1000.0	1000.000	150.0	H	0.0	1.3	28.4	60.6

1GHz-5GHz, Vertical

Limit and Margin-PK

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1955.500000	37.7	1000.0	1000.000	150.0	V	0.0	-7.6	42.9	80.6
3192.500000	41.1	1000.0	1000.000	150.0	V	0.0	-0.7	39.6	80.6
4019.250000	43.6	1000.0	1000.000	150.0	V	0.0	1.9	37.0	80.6

Limit and Margin-AV

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1955.500000	26.8	1000.0	1000.000	150.0	V	0.0	-7.6	33.8	60.6
3192.500000	30.1	1000.0	1000.000	150.0	V	0.0	-0.7	30.5	60.6
4019.250000	32.6	1000.0	1000.000	150.0	V	0.0	1.9	28.0	60.6

4.2 Other Requirement & Test Suites

4.2.1 Mains Terminal Continuous Disturbance Voltage

Result:

Pass

Date of testing : 2024.11.18
Test procedure : ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards
Frequency range : 0.15 – 30MHz
Limits : FCC Part 15, Subpart B:2023
ICES-003 Issue 7:2020
Kind of test site : Shielding Room
Operation modes : Mode C
Port : Mains
Temp.& Humidity : 21°C, 68%

The measurement setup was made according to ANSI C63.4:2014+A1:2017 in a shielded room.

The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards.

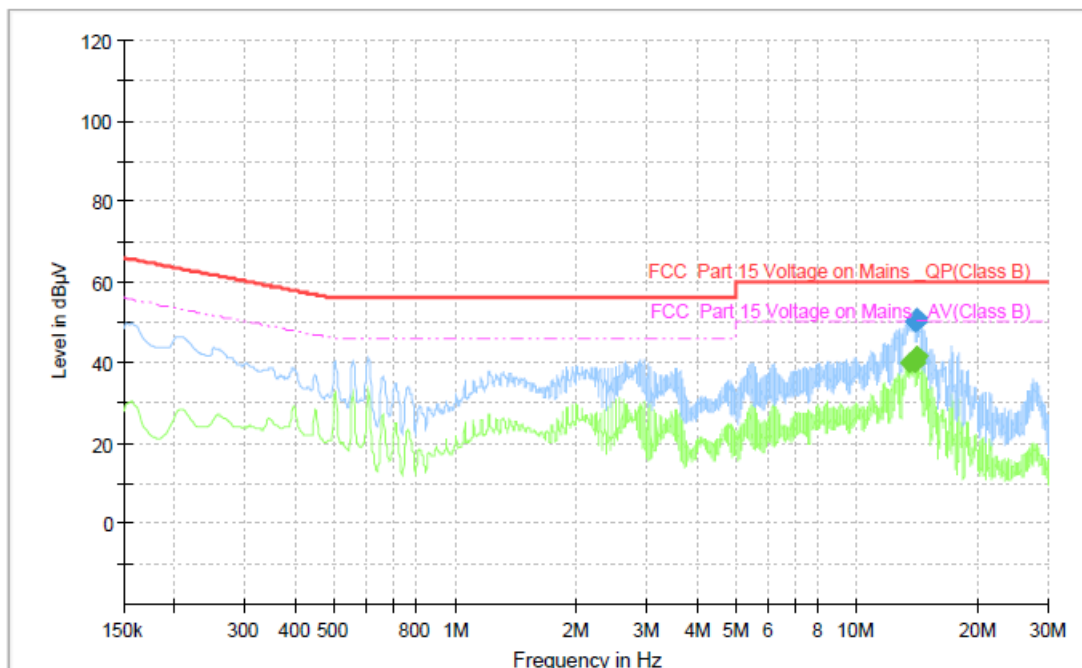
The tested object was set-up on a wooden table. The EUT was set 0.8m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m.

The disturbance voltage test was performed on the neutral line and phase line of the power supply of the EUT respectively.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

The following figures and tables were those measured by an automatic measuring system. Both Quasi Peak and Average Value were measured. Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, “♦” means Quasi-Peak Value and Average Value which were measured in final measurement.

The measurement result is calculated based on the following formula by the test software:
Emission Level = Reading level + Correction (LISN factor + cable loss)

Figure 6: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, L

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
13.456500	---	40.06	50.00	9.94	1000.0	9.000	L1	ON	10.1
13.922250	50.11	---	60.00	9.89	1000.0	9.000	L1	ON	10.1
13.974000	50.36	---	60.00	9.64	1000.0	9.000	L1	ON	10.1
13.985250	---	39.75	50.00	10.25	1000.0	9.000	L1	ON	10.1
14.023500	50.04	---	60.00	9.96	1000.0	9.000	L1	ON	10.1
14.037000	---	40.66	50.00	9.34	1000.0	9.000	L1	ON	10.1
14.075250	50.27	---	60.00	9.73	1000.0	9.000	L1	ON	10.1
14.088750	---	41.74	50.00	8.26	1000.0	9.000	L1	ON	10.1
14.140500	---	41.53	50.00	8.47	1000.0	9.000	L1	ON	10.1
14.142750	50.97	---	60.00	9.03	1000.0	9.000	L1	ON	10.1

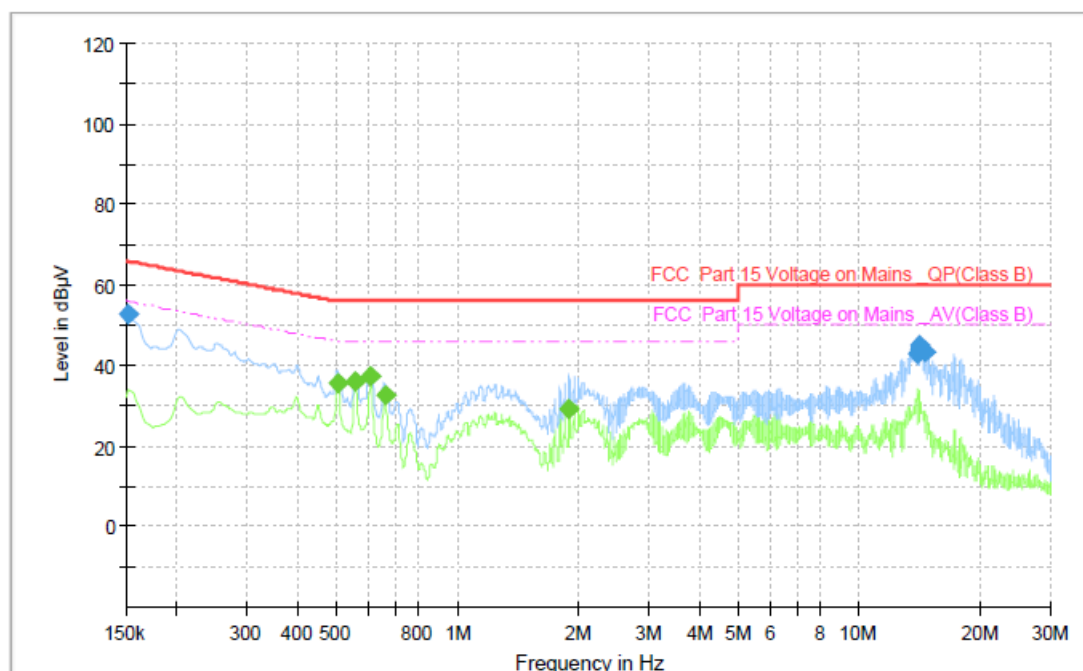
Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 21 von 25

Page 21 of 25

Figure 7: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, N



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	52.67	---	65.88	13.21	1000.0	9.000	N	ON	9.7
0.503250	---	35.76	46.00	10.24	1000.0	9.000	N	ON	9.6
0.557250	---	36.20	46.00	9.80	1000.0	9.000	N	ON	9.6
0.609000	---	37.45	46.00	8.55	1000.0	9.000	N	ON	9.6
0.660750	---	32.48	46.00	13.52	1000.0	9.000	N	ON	9.6
1.900500	---	29.38	46.00	16.62	1000.0	9.000	N	ON	9.7
14.005500	43.04	---	60.00	16.96	1000.0	9.000	N	ON	10.1
14.057250	45.03	---	60.00	14.97	1000.0	9.000	N	ON	10.1
14.111250	44.16	---	60.00	15.84	1000.0	9.000	N	ON	10.1
14.615250	43.46	---	60.00	16.54	1000.0	9.000	N	ON	10.1

Prüfbericht - Nr.: CN24CKF4 001

Test Report No.:

Seite 22 von 25

Page 22 of 25

4.2.2 Radiated disturbance

Result:	Pass
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Date of testing	: 2024.11.06
Test procedure	: ANSI C63.4:2014+A1:2017 and CISPR 16-1 series standards
Frequency range	: 30MHz-1000MHz
Limits	: Quasi-peak limits (3m test distance): FCC Part 15, Subpart B:2023 30-88MHz, 40dBμV/m; 88-216MHz, 43.5dBμV/m; 216-960MHz, 46dBμV/m; Above 960MHz, 54dBμV/m. ICES-003 Issue 7:2020 30-88MHz, 40dBμV/m; 88-216MHz, 43.5dBμV/m; 216-230MHz, 46dBμV/m; 230-960MHz, 47dBμV/m; Above 960MHz, 54dBμV/m.
Kind of test site	: Semi-anechoic chamber
Operation modes	: Mode B, Mode C
Temp.& Humidity	: 21°C, 68%

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a wooden table, which is 0.8m high. The wooden table was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

According to the clause 15.33 “Frequency range of radiated measurements” of FCC Part 15, Subpart B:2023, the highest frequency in the EUT is below 108 MHz, therefore the EUT’s upper frequency of measurement range is 1000MHz.

The following figures and tables were those measured by an automatic measurement system. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following figures, “♦” mean final measurement results with quasi-peak detector.

Before measurement, a survey was made to determine in which state the maximum disturbance was obtained. And the measurement was made in the state the maximum disturbance was obtained.

The following figures were those measured and recorded by a test receiver. Peak Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, “♦” means Quasi-Peak Value which were measured in final measurement.

The measurement result is calculated based on the following formula by the test software:
Emission Level = Reading level + Correction (Antenna factor + Cable loss - preamplifier factor (if used))

Prüfbericht - Nr.: CN24CKF4 001

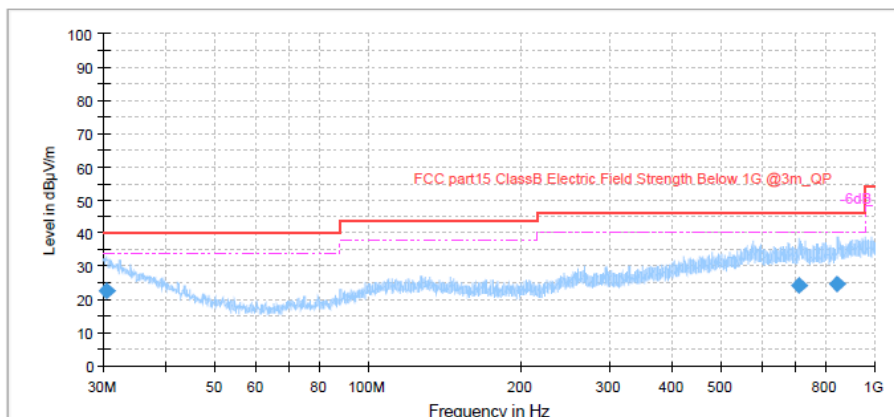
Test Report No.:

Seite 23 von 25

Page 23 of 25

Figure 8: Spectral Diagrams, Radiated disturbance, Mode B

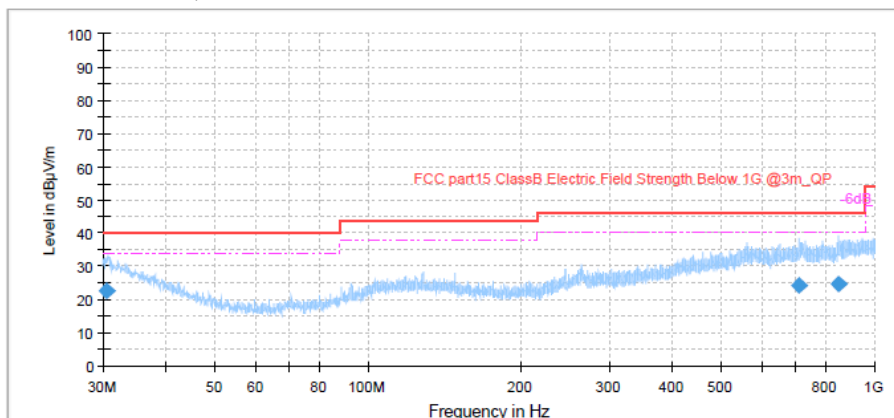
30MHz-1000MHz, Horizontal



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.411111	22.47	40.00	17.53	1000.0	120.000	122.0	H	128.0	25.2
709.475556	24.44	46.00	21.56	1000.0	120.000	136.0	H	91.0	26.9
844.673889	24.74	46.00	21.26	1000.0	120.000	231.0	H	26.0	28.4

30MHz-1000MHz, Vertical



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.346667	22.59	40.00	17.41	1000.0	120.000	109.0	V	68.0	25.2
708.993889	24.46	46.00	21.54	1000.0	120.000	238.0	V	150.0	26.9
845.412778	24.74	46.00	21.26	1000.0	120.000	191.0	V	1.0	28.4

Prüfbericht - Nr.: CN24CKF4 001

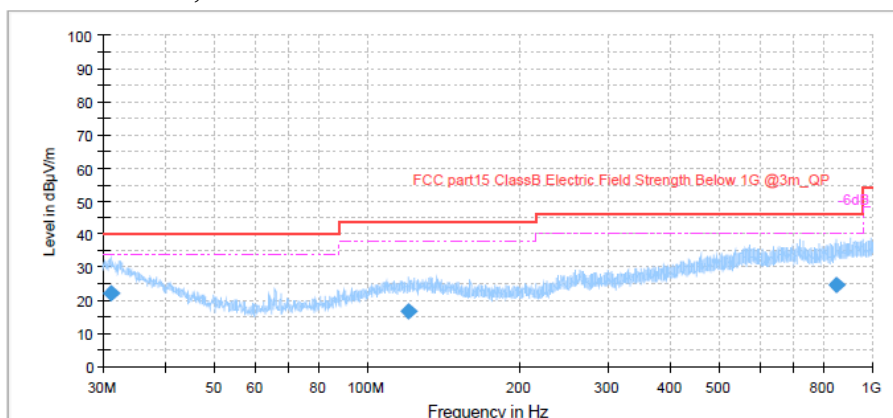
Test Report No.:

Seite 24 von 25

Page 24 of 25

Figure 9: Spectral Diagrams, Radiated disturbance, Mode C

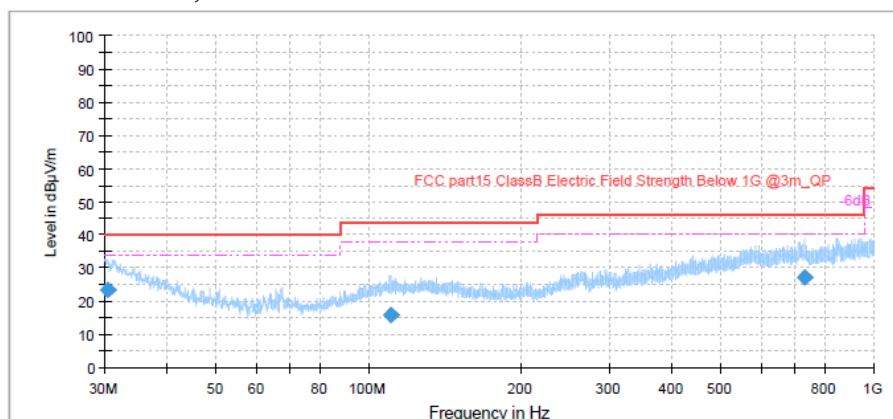
30MHz-1000MHz, Horizontal



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.203889	21.99	40.00	18.01	1000.0	120.000	185.0	H	164.0	24.8
120.325556	16.81	43.50	26.69	1000.0	120.000	185.0	H	259.0	19.0
845.305000	24.67	46.00	21.33	1000.0	120.000	109.0	H	301.0	28.4

30MHz-1000MHz, Vertical



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.505000	23.45	40.00	16.55	1000.0	120.000	185.0	V	89.0	25.2
110.500556	16.00	43.50	27.50	1000.0	120.000	119.0	V	7.0	18.7
728.553889	27.35	46.00	18.65	1000.0	120.000	150.0	V	323.0	27.4

5. List of Tables

Table 1: List of Test and Measurement Equipment, Laboratory	5
Table 2: Measurement Uncertainty	5
Table 3: General Description of EUT	6
Table 4: List of Auxiliary Equipment	7

6. List of Figures

Figure 1: Test Results of Deactivation of the Transmission	11
Figure 2: Test Results of 20dB Emission Bandwidth	12
Figure 3: Test Results of 99% Bandwidth	14
Figure 4: Field strength of fundamental	16
Figure 5: Spectral Diagrams, Radiated Spurious Emission	17
Figure 6: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, L	20
Figure 7: Spectral Diagrams, Conducted Emission, 150KHz - 30MHz, N	21
Figure 8: Spectral Diagrams, Radiated disturbance, Mode B	23
Figure 9: Spectral Diagrams, Radiated disturbance, Mode C	24

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