Test Report

23-1-0012601T010a-TR1-R01

Number of pages:	13	**Date of Report:**	2024-Sep-12
Testing company:	cetecom advanced GmbH Untertuerkheimer Str. 6-10 66117 Saarbruecken GERMANY	**Applicant:**	Rosenberger Hochfrequenztechnik GmbH & Co. KG
Product:	**RoProxCon Hybrid Transmitter/ Receiver**		
Model:	**MI1C804-901-01/ MI1C804-902-01**		
FCC ID:	2BG4VRPCH		
Testing has been carried out in accordance with:	**KDB 680106** General RF Exposure Guidance **FCC Regulations** §1.1310 § 2.1091 & 2.1093		
Additional notice:	-		
Test Results:	**☒ The EUT complies with the requirements in respect of all parameters subject to the test.** The test results relate only to devices specified in this document		

Signatures:

Niels Jeß
Head of EMC Services
Authorization of test report

Wolfgang Markus
Lab Manager
Responsible of test report

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1 General information

1.1 Disclaimer and Notes

The test results of this test report relate exclusively to the test item specified in this test report as specified in chapter 2.7. cetecom advanced does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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The documentation of the testing performed on the tested devices is archived for 10 years at cetecom advanced.

1.2 Summary of Test Results Summary of Test Results

EMISSION requirement	Port	Requirements		Result
		(Basic) standard / Emission level (Limit)	Product standard (if any)	
RF Exposure	Enclosure	FCC Regulations §1.1310 § 2.1091 & 2.1093	KDB 680106	PASS

PASSED	The EUT complies with the essential requirements in the standard.
FAILED	The EUT does not comply with the essential requirements in the standard.
NP	The test was not performed by the cetecom advanced Laboratory.
N/A	Not applicable

Decision Rule for emission testing:
cetecom advanced GmbH follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).
According to CISPR 16-4-2: $U_{Lab} < U_{CISPR}$. Therefore, the uncertainty is not considered for the statement of conformity in this test report.

2 Administrative Data

2.1 Identification of the Testing Laboratory

Company name:	cetecom advanced GmbH
Address:	Untertuerkheimer Str. 6-10 66117 Saarbruecken Germany
Responsible for testing laboratory:	Niels Jeß
Accreditation scope:	DAkkS Webpage
Test location 1:	cetecom advanced GmbH; Im Teelbruch 116; 45219 Essen
Test location 2:	--

2.2 General limits for environmental conditions

Temperature:	21 °C
Relative. humidity:	42 %rH

2.3 Test Laboratories sub-contracted

Company name:	--

2.4 Organizational Items

Responsible test manager:	Wolfgang Markus
Receipt of EUT: (yyyy-mm-dd)	2024-Jul-10
Date(s) of test: (yyyy-mm-dd to yyyy-mm-dd)	2024-Jul-25
Version of template:	24.0501

2.5 Applicant's details

Applicant's name:	Rosenberger Hochfrequenztechnik GmbH & Co. KG
Address:	Hauptstraße 1 83413 Fridolfing Germany
Contact Person:	Simon Huber
Contact Person's Email:	simon.huber@rosenberger.com

2.6 Manufacturer's details

Manufacturer's name:	Rosenberger Hochfrequenztechnik GmbH & Co. KG
Address:	Hauptstraße 1 83413 Fridolfing Germany

2.7 EUT: Type, S/N etc. and short descriptions used in this test report

EUT No.*)	Sample No.	Product	Model	Type	SN	HW	SW
EUT1	23-1-00126S04_C01	RoProxCon Hybrid Transmitter/ Receiver	MI1C804-901-01/ MI1C804-902-01	cable outlet	--	200	N/A

*) EUT short description is used to simplify the identification of the EUT in this test report.

2.8 Untested Variant (VAR)

VAR No.*)	Sample No.	Product	Model	Type	SN	HW	SW
VAR 1	23-1-00126S20_C01	RoProxCon Hybrid Transmitter	MI1C804-901-02	M12 outlet	--	200	N/A
VAR 2	23-1-00126S21_C01	RoProxCon Hybrid Receiver	MI1C804-902-02	M12 outlet	--	200	N/A

*) The listed additional untested model variant(s) (VAR) is/are not object of evaluation of compliance. For further information please see Annex 5: Declaration of applicant of model differences. If the table above does not show any other line than the headline, no untested variants are available.

2.9 Auxiliary Equipment (AE): Type, S/N etc. and short descriptions

AE No.*)	Sample No.	Auxiliary Equipment	Model	SN	HW	SW
AE 1	23-1-00126S12_C01	Load resistor	N/A	N/A	N/A	N/A
AE 2	23-1-00126S13_C01	Network tester NetAlly EtherScope	N/A	N/A	N/A	N/A
AE 3	23-1-00126S14_C01	Network tester NetAlly LinkRunner	N/A	N/A	N/A	N/A

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report. If the table above does not show any other line than the headline, no AE was used during testing nor was taken into account for evaluation

2.10 Connected cables

CAB No.*)	Sample No.	Cable Type	Connectors / Details	Length

*) CAB short description is used to simplify the identification of the connected cables in this test report. If the table above does not show any other line than the headline, no cable was used during testing nor was taken into account for evaluation

2.11 Software

SW No.*)	Sample No.	SW Name	Description	SW Status

*) SW short description is used to simplify the identification of the used software in this test report. If the table above does not show any other line than the headline, no SW was used during testing nor was taken into account for evaluation.

2.12 EUT set-ups

set-up no.*)	Combination of EUT, AE, CAB and SW	Description
1	EUT1 + AE1 + AE2 + AE3	Used for all measurements

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

2.13 EUT operation modes

EUT operating mode no.*)	Operating modes	Additional information
op. 1	1	Power transmission based on 50–200 kHz

*) EUT operating mode no. is used to simplify the test report.

3 Equipment under test (EUT)

3.1 General Data of Main EUT as Declared by Applicant

Product name	MI1C804-901-01/ MI1C804-902-01		
Kind of product	RoProxCon Hybrid Transmitter/ Receiver		
Firmware	☒ for normal use	☐ Special version for test execution	
	☐ AC Mains	--	
	☒ DC Mains	24 V DC	
	☐ Battery	--	
EUT-grounding	☒ none	☐ with power supply	☐ additional:
Operational conditions	T_{nom} = +21 °C	Value assumed, if not specified different by the manufacturer	
EUT sample type	**Engineering Samples**		
Weight	1.280kg		
Size [LxWxH]	10cm x 6.5 cm x 4 cm		
For further details refer Applicants Declaration & following technical documents			

3.2 Detailed Technical data of Main EUT as Declared by Applicant

Typical use	☐ portable use ☒ fixed use	☐ vehicular use
Equipment mobility	☐ table-top	☐ wall-mounted
	☐ floor-standing	☐ not defined
Place of use	☐ residential, commercial and light industry ☒ Industrial environment ☐ household ☐ vehicular use ☐ railway application ☐ medical ☐ laboratory environment ☐ shielded / screened environment	
Typical operating cycle	☒ < 0,5 sec.	☐ :
Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrodynamics microphones, etc.?	☐ yes ☒ no	
Is mounting position / usual operating position defined?	☒ yes ☐ no	
For further details refer Applicants Declaration & technical documents		

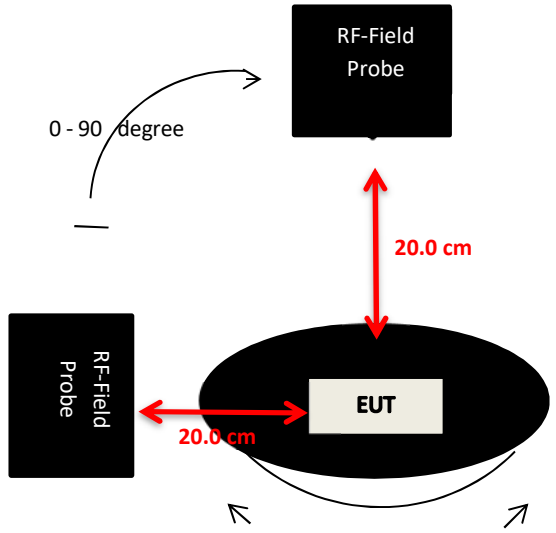
3.3 Modifications on Test sample

Additions/deviations or exclusions	--

4 Description of Test Set-up's

4.1 Test Set-up for configuration

The RF exposure test is performed in shielded room.
The EUT was placed on a table.
The measurement probe was moved at a distance of 6 cm to the EUT and
was rotated 360 degrees around the EUT to maximize the captured field strength.



Schematic: Test set-up for RF exposure measurements

Measurement for E-Field 100 kHz – 6 GHz with NBM550 + E-Field Probe EF 0691
Measurement for H-Field 1Hz – 400 kHz with ELT 400 + 100 cm^2 Probe

5 Maximum Permissible RF Exposure

5.1 FCC References & Limits

FCC Rules: §1.1310, § 2.1093

The criteria used for the evaluation of human exposure to radio frequency radiation is listed in table 1 according FCC §1.1307(b, except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this.

Note 1 to table 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provide those persons are fully aware for a exposure and can control over their exposure. Limits for occupational/controlled exposures also apply in situations when an individual is transient through a location where occupational/controlled apply provided he or she is made aware of the potential for exposure.

Note 2 to table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz

So applicable limits in this case are as follows:

§1.1310 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)
Table 1(B) Limits for General Population/Uncontrolled Exposure

0.3 -1.34 MHz => E-Field: 614 V/m, H-Field: 1.63 A/m

6 E-Field Results

6.1.1 Measurement Protocol(s)

Measurement No.	P1M1
Environmental conditions	Temperature: 21° C Humidity: 42 % rH
Test date	2024-Jul-25
Operator	Wolfgang Markus
EuT power supply:	+ 24V DC
Operating mode	01
Setup	01
Remarks	

Frequency range (MHz)	Distance between EUT and Field probe (m)	Max. E-field (V/m)	E-field Limit (V/m)	Final result
100 kHz – 6 GHz	0.2 (worst case position)	0.70	614	PASS

7 H-Field Results

7.1.1 Measurement Protocol(s)

Measurement No.	P1M1
Environmental conditions	Temperature: 21° C Humidity: 42 % rH
Test date	2024-Jul-25
Operator	Wolfgang Markus
EuT power supply:	+ 24V DC
Operating mode	01
Setup	01
Remarks	

Frequency range (MHz)	Distance between EUT and Field probe (m)	Max. H-field (A/m)	H-field Limit (A/m)	Final result
1 Hz – 400 kHz	0.2 (worst case position)	0.11	1.63	PASS

Remark: Measurement values were transformed from µT to A/m, where 1 A/m = 1.256 µT

7.1.2 Result

EMISSION requirement	Port	Requirements		Result
		Basic standard / Emission level (Limit)	Product Standard (if any)	
RF Exposure E-Field and H-Field	Enclosure	FCC Regulations §1.1310 § 2.1091 & 2.1093	KDB 680106	PASS

7.1.3 Measurement location and Equipment list

ID	Description	Manufacturer	SerNo	Cal Int.	Cal due
20616	Digitalmultimeter Fluke 177	Fluke	88900339	24 M	15.05.2026
20847	Broadband Field Meter	NBM 550	H-0929	24 M	14.04.2025
20848	E-Field Probe	EF 0391	H-0851	24 M	14.04.2025
25267	Exposure Level Tester	ELT 400	B-0135	24 M	07.10.2024

8 Results from external laboratory

None	-

9 Opinions and interpretations

None	-

10 List of abbreviations

None	-

11 Measurement Uncertainty valid for conducted/radiated measurements

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved. For uncertainty determination, each component used in the concrete measurement set-up was taken in account and it contribution to the overall uncertainty according its statistical distribution calculated.

RF-Measurement	Reference	Frequency range	Calculated uncertainty based on a confidence level of 95%	Remarks
Conducted emissions (U_{CISPR})	CISPR 16-2-1	9 kHz - 150 kHz 150 kHz - 30 MHz	4.00 dB 3.58 dB	-
Radiated emissions Enclosure	CISPR 16-2-3	30 MHz - 300 MHz 300 MHz - 1 GHz 1 GHz - 6 GHz 1 GHz - 18 GHz	SAC1: 2.60 dB SAC2: 2.62 dB SAC1: 2.90 dB SAC2: 3.00 dB SAC2: 4.10 dB SAC1: 4.98 dB	E-Field
Disturbance power	CISPR 16-2-2	30 MHz - 300 MHz	4.27 dB	-
Radiated emissions Enclosure	-	9 kHz - 30 MHz	3.76 dB	Magnetic field H-field

12 Versions of test reports (change history)

Version	Applied changes	Date of release
--	Initial release	2024-Sep-12
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End Of Test Report