

Report on the FCC and IC Testing of the EUCHNER GmbH + Co.KG CTS

In accordance with FCC 47 CFR Part 15C, ISED
Canada RSS-210 and ISED Canada RSS-GEN

Prepared for: EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
GERMANY

FCC ID: 2AJ58-18
IC: 22052-18





Product Service

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Date: 2022-04-28
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Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Patrick Müller	2022-04-28	 SIGN-ID 621625 Patrick Müller

Laboratory Accreditation

DAkKS Reg. No. D-PL-11321-11-03

DAkKS Reg. No. D-PL-11321-11-04

Laboratory recognition

Registration No. BNetzA-CAB-16/21-15

ISED Canada test site registration

3050A-2

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, ISED Canada RSS-210, Issue 10 (12-2019) and ISED Canada RSS-GEN:2018, Issue 05 (04-2018).

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Contents

1	Report Summary	2
1.1	Report Modification Record.....	2
1.2	Introduction.....	2
1.3	Brief Summary of Results	3
1.4	Application Form	4
1.5	Product Information	7
1.6	Deviations from the Standard.....	7
1.7	EUT Modification Record	7
1.8	Test Location	7
2	Test Details	8
2.1	Frequency Tolerance Under Temperature Variations.....	8
2.2	Field Strength of any Emission	10
2.3	20 dB Bandwidth	15
2.4	Restricted Band Edges.....	18
3	Photographs	20
4	Measurement Uncertainty	21



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2022-03-09
2	IC changed to "22052-18" and Test specification/issue/date in right order	2022-04-28

Table 1

1.2 Introduction

Applicant	EUCHNER GmbH + Co. KG
Manufacturer	EUCHNER GmbH + Co. KG
Model Number(s)	CTS
Serial Number(s)	125
Hardware Version(s)	V4
Software Version(s)	V1.0.1.1
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED Canada RSS-210, Issue 10 (10-2019) and ISED Canada RSS-GEN:2018, Issue 05 (04-2018)
Test Plan/Issue/Date	N/A
Order Number	5565404
Date	2021-11-25
Date of Receipt of EUT	2021-12-01
Start of Test	2021-12-08
Finish of Test	2021-12-17
Name of Engineer(s)	Patrick Müller
Related Document(s)	ANSI C63.10 (2013) ANSI C63.4: 2014



Product Service

1.3 Brief Summary

of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 24 Vdc Supply - Continuously transmitting				
2.1	15.249 (b)(2), N/A and 6.11	Frequency Tolerance Under Temperature Variations	Pass	ANSI C63.10 (2013)
2.2	15.209, 4.3 and 6.13	Field Strength of any Emission	Pass	ANSI C63.10 (2013)
2.3	15.215 (c), N/A and 6.6	20 dB Bandwidth	Pass	ANSI C63.10 (2013)
2.5	15.205, 4.1 and 8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)

Table 2



1.4 Application Form

Please enter the information below in english language, since it is directly copied to the reports, thank you!

General information (for report)	
Ordernumber (your PO number)	5565404
Brand	EUCHNER
Applicant (incl. address and contact person)	EUCHNER GmbH + Co. KG, Kohlhammerstraße 16., 70771 Leinfelden-Echterdingen, Germany, Mr. Matthias Lang
Manufacturer (when different to applicant)	---
Name and address of factory(ies)	EUCHNER GmbH + Co. KG, Kohlhammerstraße 16., 70771 Leinfelden-Echterdingen, Germany
HS Code	---



Equipment characteristics:			
Type of equipment:	Encoded non-contact safety switch with interlocking and guard locking monitoring		
Type designation*: (For IC „MN:“)	CTS		
*Please consider:	<p>If the type designation has to be changed in the report the whole test of the product has to be repeated!</p> <p>More Info:</p> <p>Only available in german language: http://www.dakks.de/sites/default/files/dokumente/71_sd_0_019_beschluesse_horizontal_20160914_v1.0.pdf</p>		
Parts of the system:	The system consists of the following components: The safety switch with guard locking contains a readhead to detect the transponder signal and a hardware to identify the transponder code. The actuator contains an encoded RFID transponder.		
Version of EUT: In case of already tested products please describe the differences to the original sample	V1.0.0.0		
Serial number:	125		
FCC ID: (If applicable)	2AJ58-18		
IC: (if applicable)	22052-18		
Modulation Method:	---		
Emission Designator:	---	---	---
Antenna Type	---		
Antenna Gain	---		
Power supply:	<input type="checkbox"/> AC Nominal: V Minimum: V Maximum: V Nominal frequency: Hz	<input checked="" type="checkbox"/> DC Nominal: 24 V Minimum: 20,4 V Maximum: 28,8 V	<input type="checkbox"/> Battery Nominal:
highest frequency generated or used within the EUT	<input checked="" type="checkbox"/> < 108 MHz		



List of ports and cables					
No.	Description	Classification ¹	Cable type	Cable length	
				used	maximum ²
D1	Power supply	Dc power	Unshielded	< 3 m	---

List of devices connected to EUT				
No.	Description	Type designation	Serial no. or ID	Manufacturer
1	EMV Prüfbox CET	Supply/Switch Box	---	EUCHNER
2				

List of support devices				
No.	Description	Type designation	Serial no. or ID	Manufacturer
1	EMV Prüfbox CET	Supply/Switch Box	---	EUCHNER
2	---	---	---	

¹ Ports shall be classified as ac power, dc power or signal/control port.

² As specified by applicant



1.5 Product Information

1.5.1 Technical Description

The product is an encoded non-contact safety switch with interlocking and guard locking monitoring, which alternatively provides a safe door position monitoring or a safeguard locking monitoring.

1.6 Deviations from the Standard

none

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: 24 V dc Supply - Continuously reading RFID Tag	
Frequency Tolerance Under Temperature Variations	Patrick Müller
Field Strength of any Emission	Patrick Müller
20 dB Bandwidth	Patrick Müller
Restricted Band Edges	Patrick Müller

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany



2 Test Details

2.1 Frequency Tolerance Under Temperature Variations

2.1.1 Specification Reference

ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause N/A and 6.11

2.1.2 Equipment Under Test and Modification State

CTS, S/N: 125 - Modification State 0

2.1.3 Date of Test

2021-12-10

2.1.4 Test Method

The EUT was set to transmit with maximum power. A spectrum analyzer was used to measure the frequency error. The temperature was adjusted between - 20°C and +55°C.

2.1.5 Environmental Conditions

Ambient Temperature 23.0 °C
Relative Humidity 29.0 %

2.1.6 Test Results

24 Vdc Supply - Continuously transmitting

Temperature	Voltage	kHz
- 20°C	24 V DC	125.00000
+ 20°C	24 V DC	125.00000
+ 20°C	20.4 V DC	125.00000
+ 20°C	27.6 V DC	125.00000
+ 55°C	24 V DC	125.00000

Table 5



Product Service

2.1.7 Test Location and Test Equipment Used

This test was carried out in a non-shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV	20219	24	2024-02-29
Climatic test chamber	ESPEC	PL-2J	18843	24	2023-04-30

Table 6

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable



2.2 Field Strength of any Emission

2.2.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-210 and ISED Canada RSS-GEN, Clause 15.209, 4.3 and 6.13

2.2.2 Equipment Under Test and Modification State

CTS, S/N: 125 - Modification State 0

2.2.3 Date of Test

2021-12-17

2.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5. and ISED Canada RSS-Gen clause 6.13.

Measurements were made at a distance of 3 m. The limit lines shown on the plot were extrapolated from either 300 m or 30 m to the measurement distance of 3 m in accordance with ANSI C63.10 Clause 6.4.4.2.

For any emissions detected within 20 dB of the limit, a final measurement was made and recorded in the table below. The detector used for these measurements was a quasi-peak detector except for emissions within the bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where a CISPR average detector was used.

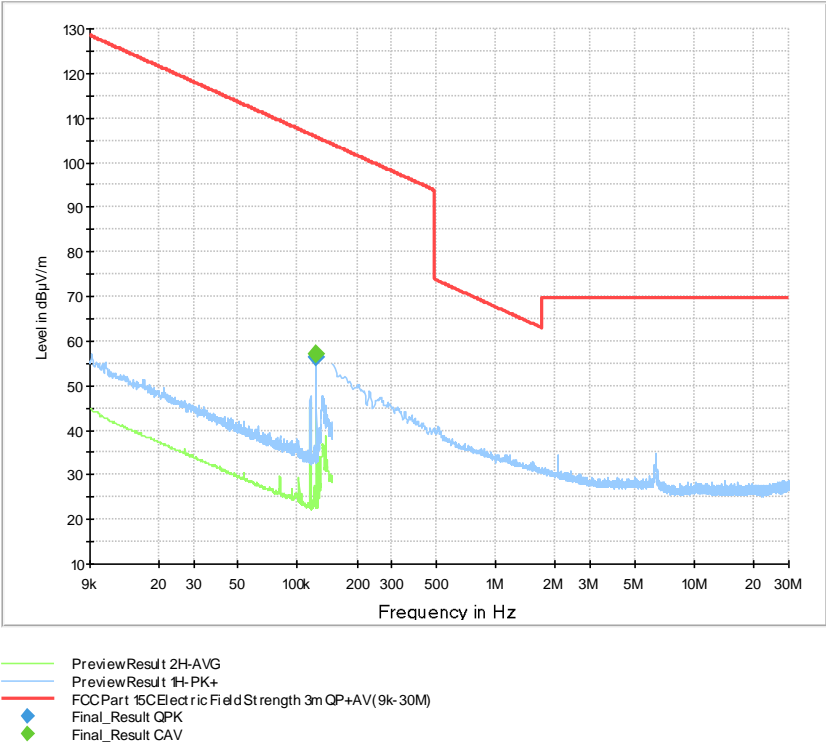
2.2.5 Environmental Conditions

Ambient Temperature	22.0 °C
Relative Humidity	32.0 %



2.2.6 Test Results

Continuously transmitting

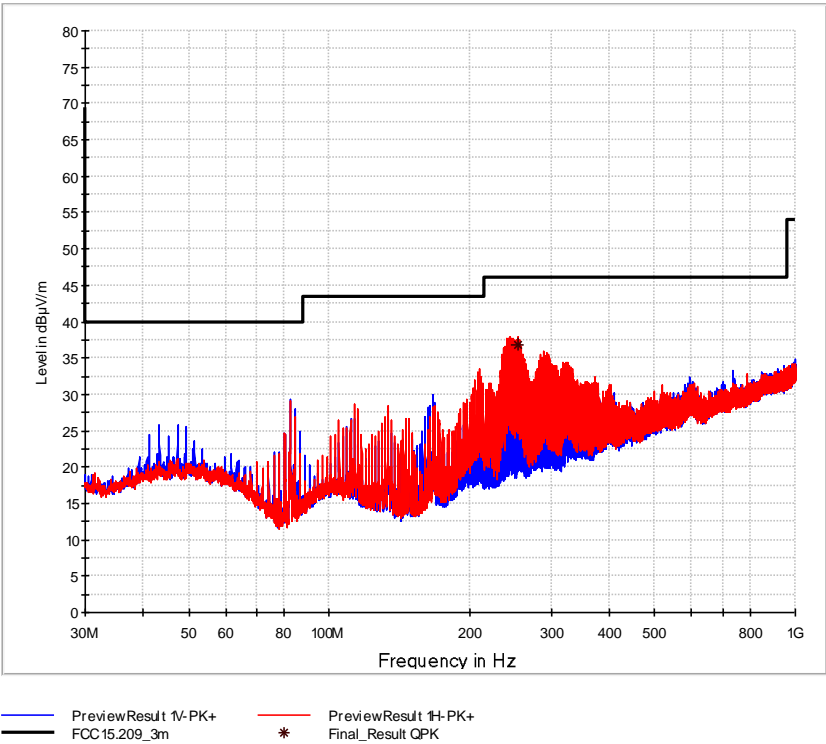


Final Results 1:

Frequency	QuasiPeak	CAverage	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.
MHz	dBµV/m	dBµV/m	dBµV/m	dB	ms	kHz	cm		deg	dB/m
0.125000	---	56.96	---	---	1000.0	0.200	100.0	H	62.0	19.3
0.125000	56.46	---	105.67	49.21	1000.0	0.200	100.0	H	62.0	19.3



Product Service



Final Results:

Frequency MHz	QuasiPeak dBµV/m	Limit dBµV/m	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB/m
253.410000	36.80	46.00	9.20	1000.0	120.000	122.0	H	111.0	18.3



FCC 47 CFR Part 15. Limit Clause 15.209

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1.705 to 30	30	30
30 to 88	100**	3
88 to 216	150**	3
216 to 960	200**	3
Above 960	500	3

Table 7 - FCC Limit

NOTE: The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.

ISED Canada RSS-210. Limit Clause 4.4

Under no circumstance shall the level of any unwanted emissions exceed the level of the fundamental emissions.

ISED Canada RSS-Gen. Limit Clause 8.9

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	300
0.490 to 1.705	24000/F (kHz)	30
1705 to 30	30	30

Table 8 - IC Limit. Below 30 MHz

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at 3 metres)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 9 - IC Limit. Above 30 MHz



2.2.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop Antenna	Schwarzbeck	FMZB 1519B	18876	36	2023-01-23
Ultralog	Rohde & Schwarz	HL562E	39969	36	2022-11-30
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2022-04-30
EMC measurement software	Rohde & Schwarz	EMC32	19719	N/A	N/A

Table 10

TU - Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

N/A - Not Applicable



2.3 20 dB Bandwidth

2.3.1 Specification Reference

FCC 47 CFR Part 15C. ISED Canada RSS-210 and ISED Canada RSS-GEN. Clause 15.215 (c).
N/A and 6.6

2.3.2 Equipment Under Test and Modification State

CTS S/N: 125 - Modification State 0

2.3.3 Date of Test

2021-12-10

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10. clause 6.9.1.

2.3.5 Environmental Conditions

Ambient Temperature 20.0 °C
Relative Humidity 52.0 %

2.3.6 Test Results

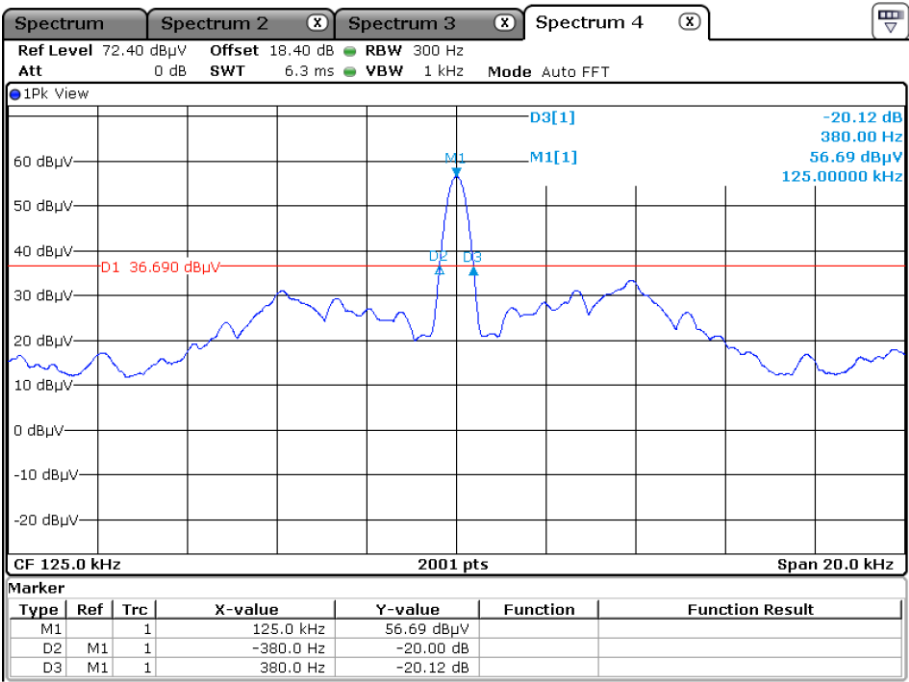
24 Vdc Supply - Continuously transmitting

Frequency (kHz)	20 dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	F _{LOWER} (kHz)	F _{UPPER} (kHz)
125.0	0.760	7.956	124.62	135.38

Table 11

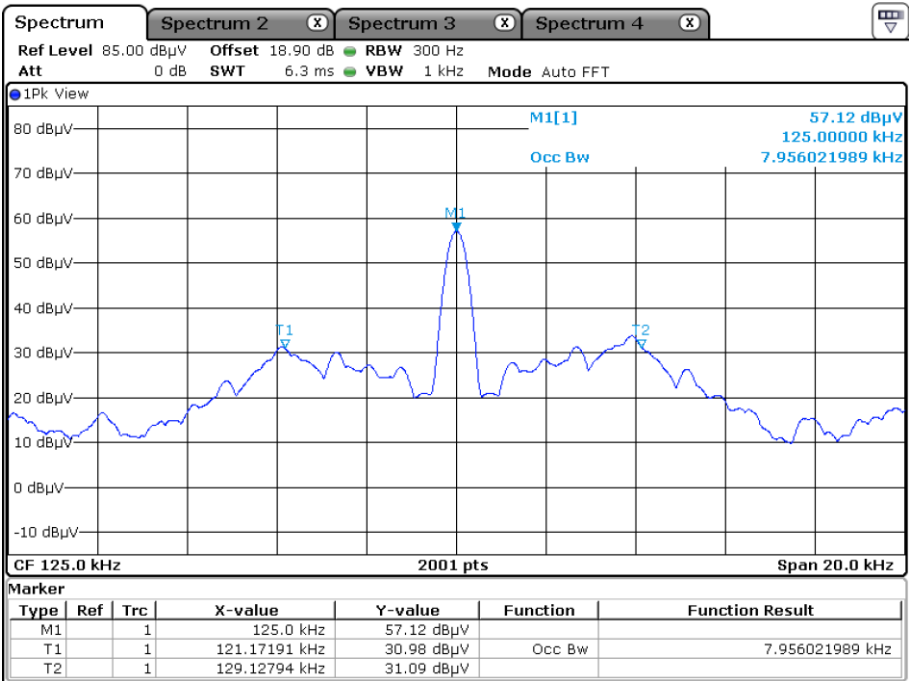


Product Service



Date: 10.DEC.2021 11:24:24

20 dB Bandwidth



Date: 10.DEC.2021 10:57:55

99% Occupied Bandwidth



FCC 47 CFR Part 15. Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

ISED Canada RSS 210 and ISED Canada RSS GEN. Limit Clause

None specified.

2.3.7 Test Location and Test Equipment Used

This test was carried out in a non-shielded room.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV	20219	24	2024-02-29
Climatic test chamber	ESPEC	PL-2J	18843	24	2023-04-30

Table 12

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable



2.4 Restricted Band Edges

2.4.1 Specification Reference

FCC 47 CFR Part 15C. ISED Canada RSS-210 and ISED Canada RSS-GEN. Clause 15.205. 4.1 and 8.10

2.4.2 Equipment Under Test and Modification State

CTS. S/N: 125 - Modification State 0

2.4.3 Date of Test

2021-12-17

2.4.4 Test Method

This test was performed in accordance with ANSI C63.10. clause 11.13.1.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3.

Final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

2.4.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	52.0 %

2.4.6 Test Results

24 Vdc Supply - Continuously transmitting

See chapter 2.2 for results.



FCC 47 CFR Part 15. Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

Table 13

ISED Canada RSS-GEN. Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

Table 14

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

2.4.7 Test Location and Test Equipment Used

This test was carried out in Semi anechoic room - cabin no. 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Loop Antenna	Rohde & Schwarz	HFH2-Z2	18876	36	2022-08-31
TRILOG Antenna	Schwarzbeck	VULB 9163	19691	24	2024-03-31
EMI test receiver	Rohde & Schwarz	ESW44	c	12	2024-03-31
EMC measurement software	Rohde & Schwarz	EMC32-ME+	19719	N/A	N/A

Table 15

TU - Traceability Unscheduled
 O/P Mon – Output Monitored using calibrated equipment
 N/A - Not Applicable



Product Service

3 Photographs

See Annex A.

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	$\pm 1.14 \%$	2
RF-Frequency error	1.96	$\pm 1 \cdot 10^{-7}$	7
RF-Power, conducted carrier	2	$\pm 0.079 \text{ dB}$	2
RF-Power uncertainty for given BER	1.96	$+0.94 \text{ dB} / -1.05$	7
RF power, conducted, spurious emissions	1.96	$+1.4 \text{ dB} / -1.6 \text{ dB}$	7
RF power, radiated			
25 MHz – 4 GHz	1.96	$+3.6 \text{ dB} / -5.2 \text{ dB}$	8
1 GHz – 18 GHz	1.96	$+3.8 \text{ dB} / -5.6 \text{ dB}$	8
18 GHz – 26.5 GHz	1.96	$+3.4 \text{ dB} / -4.5 \text{ dB}$	8
40 GHz – 170 GHz	1.96	$+4.2 \text{ dB} / -7.1 \text{ dB}$	8
Spectral Power Density, conducted	2.0	$\pm 0.53 \text{ dB}$	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	$\pm 2.89 \%$	2
6 kHz – 25 kHz	2	$\pm 0.2 \text{ dB}$	2
Maximum frequency deviation for FM	2	$\pm 2.89 \%$	2
Adjacent channel power 25 MHz – 1 GHz	2	$\pm 2.31 \%$	2
Temperature	2	$\pm 0.39 \text{ K}$	4
(Relative) Humidity	2	$\pm 2.28 \%$	2
DC- and low frequency AC voltage			
DC voltage	2	$\pm 0.01 \%$	2
AC voltage up to 1 kHz	2	$\pm 1.2 \%$	2
Time	2	$\pm 0.6 \%$	2

Table 16



Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5μH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50μH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50μH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes. Voltage Fluctuations and Flicker			4

Table 17



Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances. induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips. Short Interruptions and Voltage Variations			4
Oscillatory Waves			4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 18

Note 1:

The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 2:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 3:

The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2.05$. providing a level of confidence of $p = 95.45\%$

Note 4:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.

Note 5:

The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 6:

The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of $k_p = 2$. providing a level of confidence of $p = 95.45\%$

Note 7:

The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$. providing a level of confidence of $p = 95.45\%$

Note 8:



Product Service

The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of $k_p = 1.96$, providing a level of confidence of $p = 95.45\%$