TEST REPORT # EMCC-960704.6JB, 2022-05-19

This test report supersedes test report # EMCC-960704.6J, 2022-04-11

EQUIPMENT UNDER TEST:

Trade Name:	DATALOGIC
Model/ Type:	BC9600-910 / CM9630
Serial Number(s):	B21P18140,
Application:	Charging Stand
FCC:	U4FBC9600
IC:	3862D-BC9600
Manufacturer:	DATALOGIC S.r.l.
Customer:	PRS LAB S.R.L. UNIPERSONALE
Address:	Via Campagna, 92 22020 Faloppio (CO) ITALY
Phone:	+39 031 3500011
E-Mail:	rpfeiffer@primaricerca.it

Relevant Standard(s): RSS-102 Issue 5
47 CFR §1.1310

Measurement Procedure: SPR-002 Issue 1
KDB680106 D01, v03
Limited tests performed, only

TEST REPORT PREPARED BY:

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Tested: Approved:

Reinhard Sauerschell | Daniel Körber | Reinhard Sauerschell

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0 REVISION HISTORY

Project number	Issue date	Chapter	Description
960704.6J	2022-04-11	n.a.	Initial issue
960704.6JB	2022-05-19	1.3	FCC Test Firm Registration Number, ISED CAB identifier, ISED company number added
		2.1	PMN, HVIN, FVIN added
		2.1	Lower frequency changed

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance with the 47 CFR §1.1310 and RSS-102 Issue 5 requirements applicable to Wireless Power Transfer (WPT) devices.

1.2 Limits and reservations

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report. This test report shall not be reproduced except in full without the written permission of EMCCons DR. RAŠEK GmbH & Co. KG. Document(s) and/or information, which were provided by the customer, can affect the validity of results.
Note: limited tests performed only; frequencies above 30 MHz are not measured according to specific agreement with the customer.

1.3 Test laboratory

Test laboratory:	EMCCons DR. RAŠEK GmbH & Co. KG
Address of Labs I, II, III and Head Office:	EMCCons DR. RAŠEK GmbH & Co. KG Boelwiese 8 91320 Ebermannstadt GERMANY
Address of Labs IV and V:	EMCCons DR. RAŠEK GmbH & Co. KG Stoernhofer Berg 15 91364 Unterleinleiter GERMANY
Phone:	+49 9194 7262-0
Fax:	+49 9194 7262-199
E-mail:	info@emcc.de
Web:	www.emcc.de
FCC Test Firm Registration Number:	368753
ISED CAB identifier:	DE0002
ISED company number:	3464C

1.4 Customer

Company name:	PRS LAB S.R.L. UNIPERSONALE
Street:	Via Campagna, 92
City:	22020 Faloppio (CO)
Country:	ITALY
Name:	Riccardo Pfeiffer
Phone:	+39 031 3500011
Fax:	+39 031 991309
E-mail:	rpfeiffer@primaricerca.it

1.5 Manufacturer

Company name:	DATALOGIC S.r.l.
Street:	Via S. Vitalino 13
City:	40012 Lippo De Calderara Di Reno
Country:	ITALY
Phone:	+39 051 3147196
Fax:	+39 051 3147561

1.6 Dates and test location

Date of receipt of EUT:	2022-02-16
Test date:	2022-02-24 / 28
Test location:	Lab IV

1.7 Ordering information

Purchase order:	9/00
Date:	2022-02-04
Vendor number:	600201

1.8 Climatic conditions

Date --	Temperature °C	Relative humidity %	Air pressure hPa	Lab --	Customer attended tests --
2022-02-24	22	32	973	IV	---
2022-02-28	21	28	990	IV	---

2 PRODUCT DESCRIPTION

2.1 Equipment under test (EUT)

The following data is based on customer's information unless indicated on EUTs.

Manufacturer:	DATALOGIC S.r.l.	
Trade name:	DATALOGIC	
Product description:	Wireless Charger Base Unit	
Model/ Type:	BC9600-910 / CM9630 PMN: BC9600-910 HVIN: BC9600-910 FVIN: NA	
Serial No(s):	EUT #1: B21P18140	
Type of used reader:	PM9600 / DHP910RB	
Incorporated RF service:	910 MHz data link	
Firmware version:	A	
Hardware version:	A	
FCC ID:	U4FBC9600	
IC:	3862D-BC9600	
Application:	Base Station with wireless charging and data communication capability	
Equipment class:	Wireless Power Transmission System (WPT)	
Type of modulation:	Backscatter modulation, as stated in [6]	
Data rate(s):	500 kbps	
Charging operating frequency:	Lower Frequency [MHz] 0.134	Upper Frequency [MHz] 0.148
Nominal charging power:	10 W, as stated in [6]	
Highest internal frequency:	EUT #1: 927.484 MHz as stated in [6]	
Antenna:	Integral	
Voltage:	24 VDC via power supply	
Nominal total power:	Excerpt from [6]: 5 VDC, max 500 mA from USB 10-30 VDC, max 1,5 A from power supply	
WPT classification:	type 3 category 1	

Excerpt of [7]:

Differences between versions declared by manufacturer		
MODEL NAME		BC9600-910
TESTED TYPE	CM9630	The difference between the connection modules variants is related to the external interface offered (example: RJ45 connection for type CM9631 or RJ45 connection + connector for the AC / DC adapter for CM9630). These differences do not affect neither the radio not the WPT component.
VARIANTS	CM9631	
	CM9680	
	CM9681	

According to Manufacturer declaration, the tested model is the most representative and the most complex. The differences between the tested one and his variants are described in the table and are declared by Manufacturer.

2.2 Test Specification(s), standard(s) and relevant document(s)

Document(s) and/or information which were provided by the customer can affect the validity of results.

Reference	Doc. number	Issue	Description	Remark
[1]	RSS-102	Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	
[2]	SPR-002	Issue 1	Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits	
[3]	KDB680106 D01	v03, 2018-04-09	RF exposure considerations for low power consumer wireless power transfer applications	
[4]	47 CFR §1.1310	---	Radiofrequency radiation exposure limits	
[5]	RSS-216	Issue 2 Jan. 2016	Wireless Power Transfer Devices	
[6]	Datalogic Powerscan9600series_ Operational_Description	Rev 6	Data sheet for the EUT provided by the customer by e-mail on 2021-12-22	
[7]	E-Mail from customer	2022-04-01	Description of variants and declaration	

2.3 Intended use

The following description was provided by the customer:

Base Charger/ Station is intended to charge with wireless charging system the hand held reader and/or receive data from hand held reader via narrow band link.

2.4 EUT peripherals/simulators

The EUT peripheral consist of a power supply and a PC that is used for power observation of the EUT. The EUT is connected to the PC via an USB cable that is connected permanently to the EUT.

The input of the power supply is AC 100 ... 240 V at 50/60 Hz, the output is DC 24 V, 3.0 A.

In order to operate and monitor the EUT a software script was pre-installed on the PC.

Power supply:

Manufacturer:	EDACPOWER ELEC.
Model:	EA10681V-240

Software script:

Manufacturer:	MicroRidge Systems Inc.
Version:	3.1.0.133 released 2019-04-02

2.5 Mode of operation during testing and test setup

The equipment under test (EUT) was operated during the tests under the following conditions, as described by the customer:

The charging stand is connected with the power supply and with the LapTop. The reader is placed on the charging stand. The software script set the internal RF module to the maximum RF power and allows the monitoring of the actual charging power in mW. During the tests the wireless charging power was about 67 % of the maximum declared power, hence calculating and upscaling the results to the declared maximum power is required.

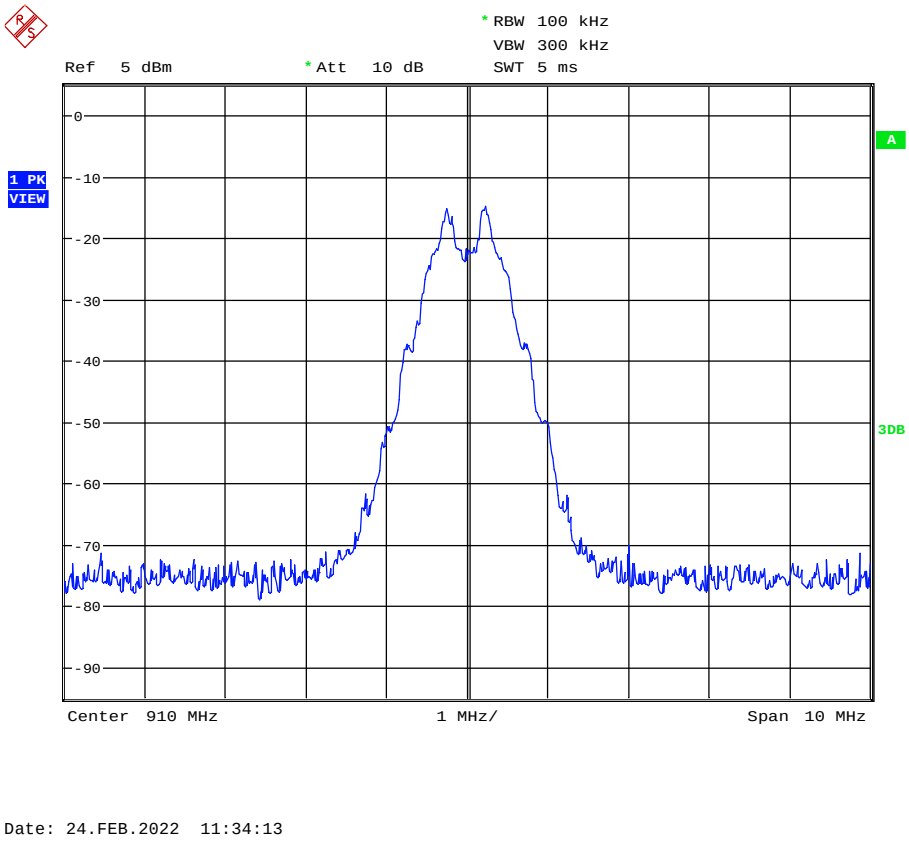
2.5.1 Operation condition EUT#1 (910 MHz unit)

The charging power during the tests was > 6700 mW, i.e. > 67 % of declared maximum power of 10 Watt, as monitored with the MicroRidge Software.

MicroRidge Software (samples of data):

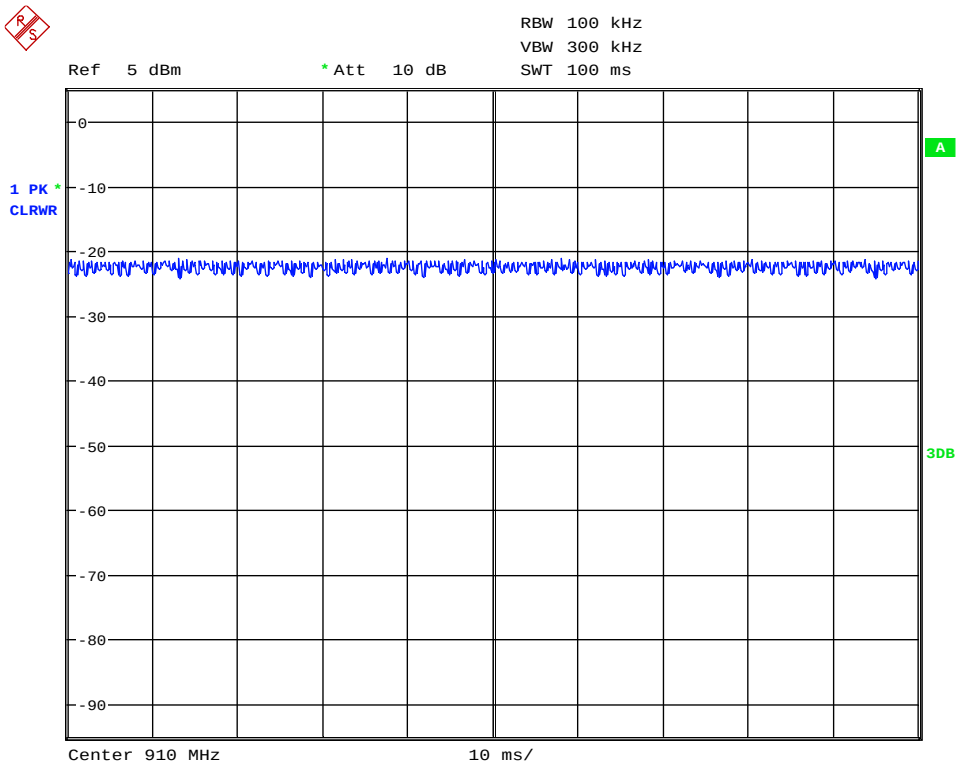
The RF signal of the 910 MHz module was measured with a spectrum analyser in order to check the behaviour and quality of the signal.

910 MHz Signal, frequency domain:



Test on DATALOGIC BC9600-910 / CM9630 to 47 CFR §1.1310 and RSS-102 Issue 5

910 MHz Signal, time domain:



Date: 24.FEB.2022 11:32:36

Result: a duty cycle of 100 % was observed.

2.6 Modifications required for compliance

EUT	Modification #	Description of EUT modification	Description of Setup modification
1	none	None, as received from customer	—

3 TEST RESULTS SUMMARY

Summary of test results for the following EUT:

Manufacturer: DATALOGIC S.r.l.
Trade name: DATALOGIC
Type: CM9630
Serial No.: EUT #1: B21P18140

Requirement	Standard	Report Section	Tested EUT	Result
RF Exposure Evaluation	47 CFR §1.1310	6	EUT #1	Compliant
	RSS-102	6	EUT #1	Compliant up to 30 MHz, Note
Nerve stimulation	RSS-102, SPR-002	7	EUT #1	Compliant

Note: frequencies above 30 MHz are not measured according to specific agreement with the customer. Further evaluation for the whole applicable frequency range, especially including the wireless data transfer service (910 MHz) emissions, required.

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein.
Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.
The measurements contained in this report were made in accordance with the procedures described in KDB680106 D01 and SPR-002 Issue 1 and all applicable Public Notices received prior to the date of testing. All requirements were found to be within the limits outlined in this report.

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report and refer only to the wireless power transfer system. Other intentional or unintentional emissions are not taken into account.

Test personnel: Reinhard Sauerschell, Daniel Körber
Issuance date: 2022-05-19

4 PRINCIPLE TEST SETUP

SETUP A (distance from surface of EUT to center of probe)
SCHEMATIC TEST SETUP OF FIELD STRENGTH MEASUREMENT

SETUP B (distance from surface of EUT to surface of probe)
SCHEMATIC TEST SETUP OF FIELD STRENGTH MEASUREMENT

5 EXTRAPOLATION TO MAXIMUM POWER

The monitored charging power during the tests reached a quantity of some 67 % of the declared maximum power.
Hence an extrapolation of the results to maximum power is used in following test protocols.

Considering
- a constant impedance of the load, i.e. charging coil,
- the formula P = U x I,
- linear dependency of E and H on U and I,

and provided that harmonics will increase linearly with the carrier,
- the factor for power is k(p) = 1 / 0.67 = 1.493,
- hence the factor for E and H is k = SQRT (1 / 0.67) = 1.22.

Before the tests the behavior of the emitted H-field during the switch-on and switch-off process was measured, in order to investigate hidden overshoots in the transition periods.
The test was performed with a loop antenna and an oscilloscope.
The reader was put into the charging stand, i.e. starting the charging process, and then taking away, i.e. stopping the charging process.

Oscilloscope plot:

Vertical marker 1 (t1): reader placing into the charging stand, i.e. start of charging
Vertical marker 2 (t2): reader taking away from the charging stand, delay of some 1.5 sec until stop of charging
Horizontal marker 3 (V1): quantity during charging
Horizontal marker 4 (V2): quantity during switch off process

It can be seen, that a light increasing of the quantity, i.e. H-field, is present during the switch-off process. The increase is of about 7 %, and below the factor k = 1.22, as calculated above. Hence the factor k = 1.22 will be taken into account in further considerations.

6 RF EXPOSURE EVALUATION ACCORDING TO 47 CFR §1.1310

Test requirement: 47 CFR §1.1310
Test procedure: KDB680106 D01

6.1 Regulation

KTB 680106 D01, chapter 3. RF EXPOSURE REQUIREMENTS

...

c) For devices designed for typical desktop applications, such a wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m. Below 100 kHz, applicable reference levels for maximum instantaneous exposure field strengths are defined in clause 3.a).(2).

...

Excerpt from **Table 1 of §1.1310** - Limits for Maximum Permissible Exposure:

Frequency range (MHz) Note 2	Electric field (V/m rms)	Magnetic field (A/m rms)	Power density (mW/cm^2)	Reference period (minutes) Note 1
0.3-3.0	614	1.63	(100)*	≤6 / <30
Note 1: Reference period depends on limit for occupational/controlled or general/uncontrolled exposure. Note 2: Emissions between 100 to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of §1.1310 * Plane-wave equivalent power density				

KTB 680106 D01, chapter 5. EQUIPMENT APPROVAL CONSIDERATIONS

....

b) Inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC 2or a PAG3 for equipment approved using certification to address RF exposure compliance. However, the responsible party is required to keep a copy of the test report in accordance with KDB 865664 D02. A copy of the test report is to be submitted with the application if the device is approved using certification.

(1) Power transfer frequency is less than 1 MHz

(2) Output power from each primary coil is less than or equal to 15 watts.

(3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.

(4) Client device is placed directly in contact with the transmitter.

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).

(6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

....

6.2 Test procedure

The EUTs were placed on a non-conductive table, and were operating as described above in chapter 2.5.
The electrical and magnetic field strength was measured at a distance of 15 cm from the EUT according to setup A.
The E-/H-sensor is a 3-axis isotropic probe, which allows frequency-selective measurements.
The frequency range is 100 kHz to 3 MHz in order to measure the fundamental and up to the 20^{th} harmonic emission of the WPT emitter.
The complete surface of the EUTs, i.e. all 4 sides and top and bottom, were scanned with the field probe in order to detect the maximum emission level.

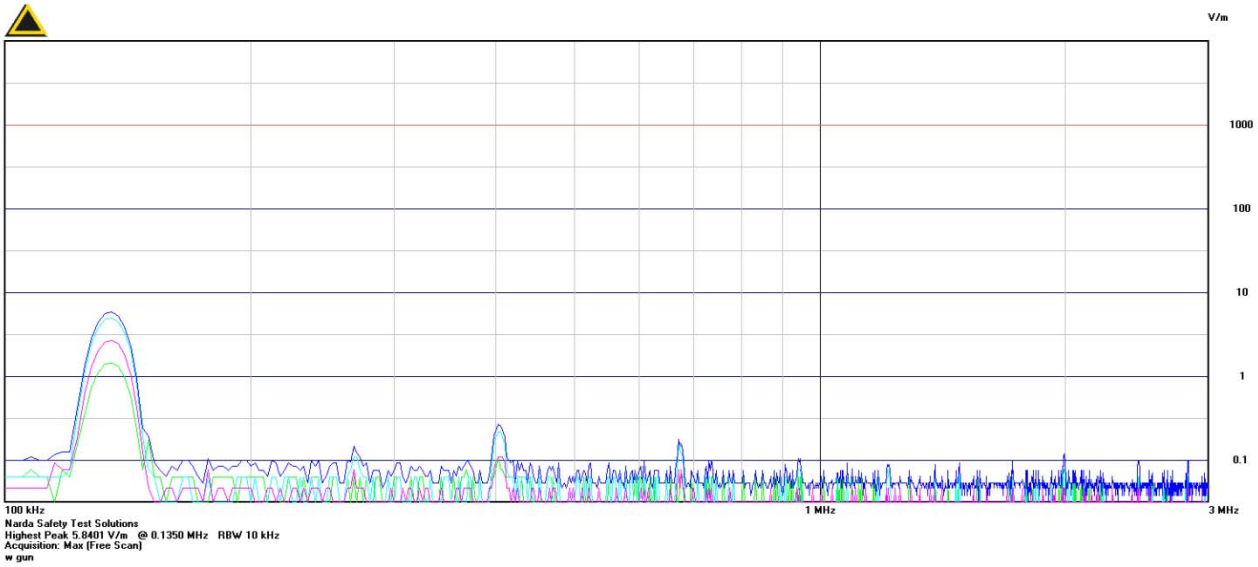
6.3 Pictures of setup

Distance EUT to field probe 15 cm:

EUT on non-conductive table (sample picture):

6.4 Measurement data EUT#1 (910 MHz unit)

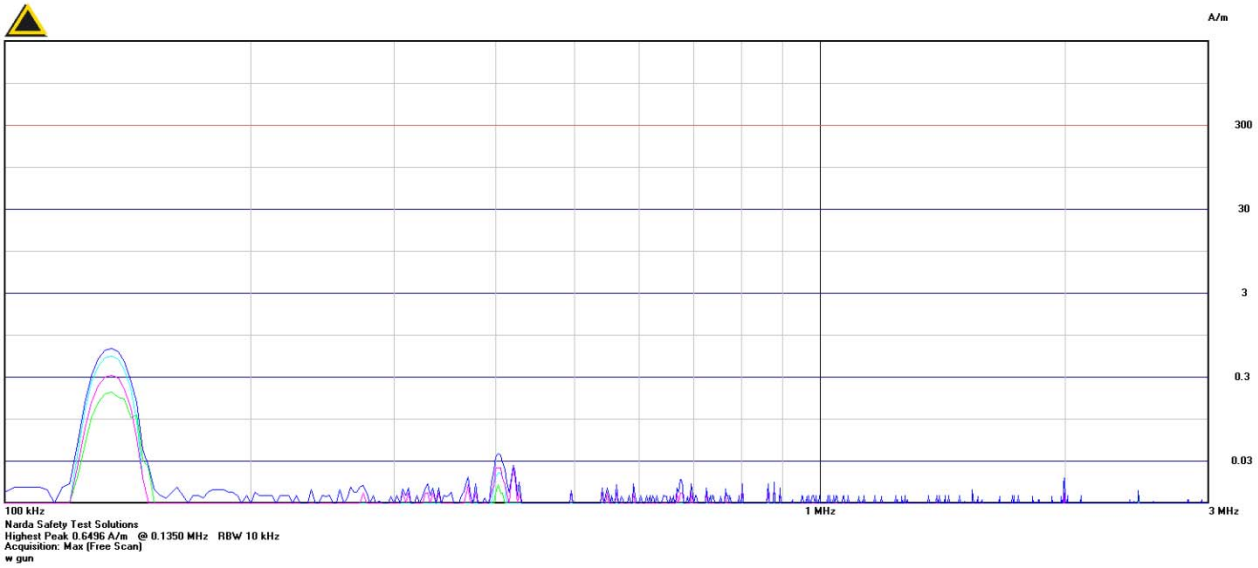
E-field 100 kHz to 3 MHz, Test distance 15 cm:



Data table:

Frequency (kHz)	E-field strength (V/m)	E-field strength corrected with k = 1.22 (V/m)	RF Field strength limit (V/m)	50% of RF Field strength limit (V/m)
135	5.84	7.12	614	307
Further emissions more than 20 dB below fundamental				

Plot H-field 100 kHz to 3 MHz, Test distance 15 cm:



Data table:

Frequency (kHz)	H-field strength (A/m)	H-field strength corrected with k = 1.22 (A/m)	RF Field strength limit (A/m)	50% of RF Field strength limit (A/m)
135	0.65	0.79	1.63	0.81
Further emissions more than 20 dB below fundamental				

6.5 Test result

Result as per KDB680106 D01, chapter 5.b)

5. EQUIPMENT APPROVAL CONSIDERATIONS

b) Inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC or a PAG for equipment approved using certification to address RF exposure compliance. However, the responsible party is required to keep a copy of the test report in accordance with KDB 865664 D02. A copy of the test report is to be submitted with the application if the device is approved using certification.

(1) Power transfer frequency is less than 1 MHz.
Result: The power transfer frequency is about 135 kHz.

(2) Output power from each primary coil is less than or equal to 15 watts.
Result: The EUT fulfils this requirement according to customer's declaration.

(3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.
Result: The EUT fulfils this requirement according to customer's declaration.

(4) Client device is placed directly in contact with the transmitter.
Result: The reader (client device) is placed directly in contact with the charging stand (transmitter).

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
Result: The charging stand is not portable.

(6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.
Result: The EUT fulfils this requirement. See tables above.

Manufacturer:	DATALOGIC S.r.l.
Model/Type:	BC9600-910 / CM9630
Serial No.:	EUT #1: B21P18140
Modifications:	None
Test date:	2022-02-24
Test personnel:	Reinhard Sauerschell, Daniel Körber

The EUTs meet the requirements of this section.

7 RF EXPOSURE ACCORDING TO RSS-102

Test requirement: RSS-102 Issue 5, RSS-216 Issue 2
Test procedure: IEEE C95.3, SPR-002 Issue 1

7.1 Regulation

RSS-102 Chapter 4 Exposure Limits
For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.[18]

[18] Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz* (hiip://www.hc-sc.gc.ca/ew h-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php).

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

RSS-216, chapter 6.4.4 RF Exposure from WPT Devices that are Category I Radio Apparatus
RF exposure shall be evaluated with the client devices charged/powered by the source device at maximum output power. Additionally, all transmitters, including those not used for wireless power transfer, must be active simultaneously and at maximum power.
For WPT devices designed for desktop applications (e.g. wireless charging pads), RF exposure shall be evaluated at 10 cm away from all sides and from the top of the WPT device / system. The 10 cm shall be as measured from the probe centre to the WPT device / system edge.

7.2 Multiple frequency calculation

Multiple frequency emissions are added using the following SAR formulae (thermal effects, according to ICNIRP guidelines):

$$\Sigma (E_m / E_{RL})^2 \leq 1$$

where:
E_m = Measured electric field at a specific frequency
E_{RL} = Reference level limit for the electric field at the measurement frequency

$$\Sigma (H_m / H_{RL})^2 \leq 1$$

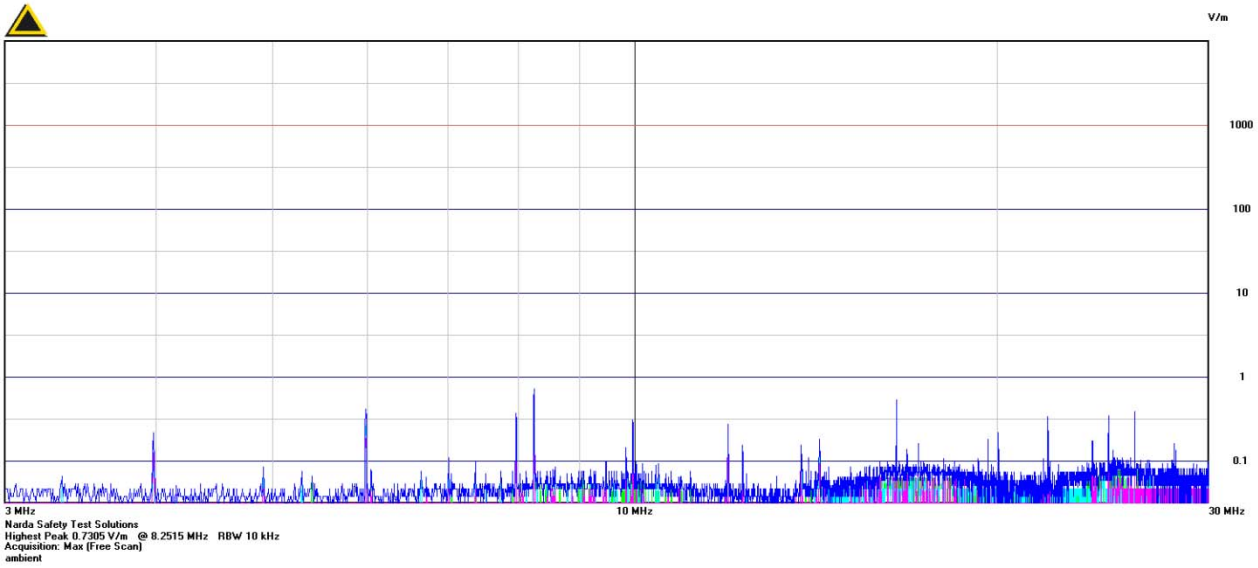
where:
H_m = Measured magnetic field at a specific frequency
H_{RL} = Reference level limit for the magnetic field at the measurement frequency

7.3 Test procedure

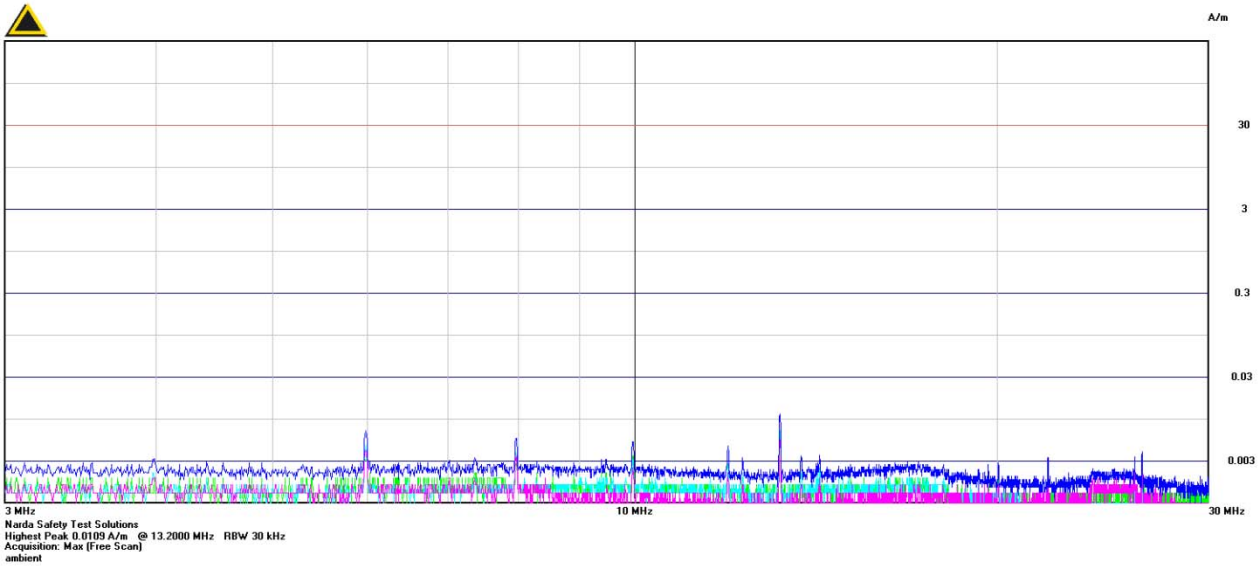
The EUTs were placed on a non-conductive table, and were operating as described above in chapter 2.5.
The electrical and magnetic field strength was measured at a distance of 10 cm from the EUT according to setup A.
The E-/H-sensor is a 3-axis isotropic probe, which allows frequency-selective measurements.
The measured frequency range is from 100 kHz (H-field) / 1 MHz (E-field) to 30 MHz, split into 2 frequency ranges according to the capabilities of the probe.
The complete surface of the EUTs, i.e. all 4 sides and top and bottom, were scanned with the field probes in order to detect the maximum emission level.
Note: frequencies above 30 MHz are not measured according to specific agreement with the customer.

Ambient emissions were observed in the frequency range 3 MHz to 30 MHz.
Ambient emissions not taken into account for result calculations.

Plot ambient E-field emissions:

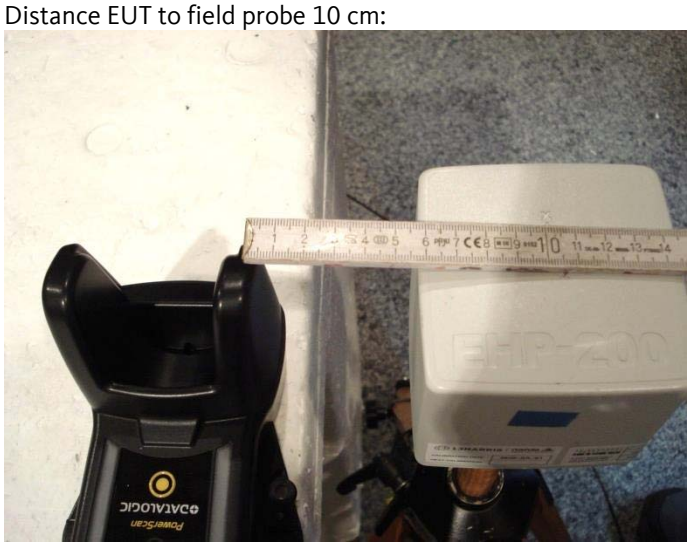


Plot ambient H-field emissions:



7.4 Pictures of setup

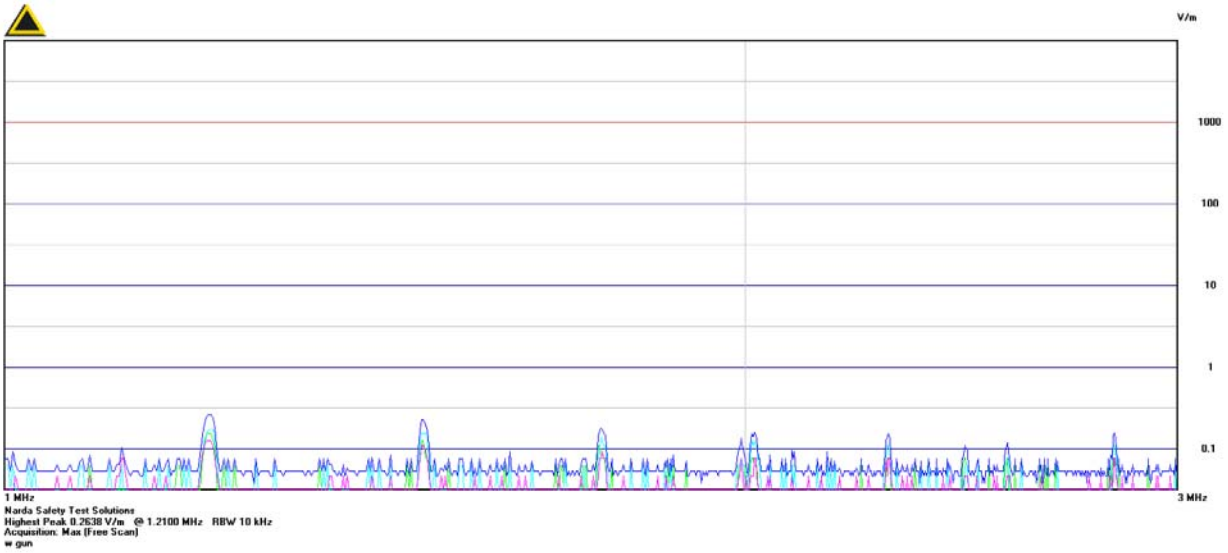
Distance EUT to field probe 10 cm:



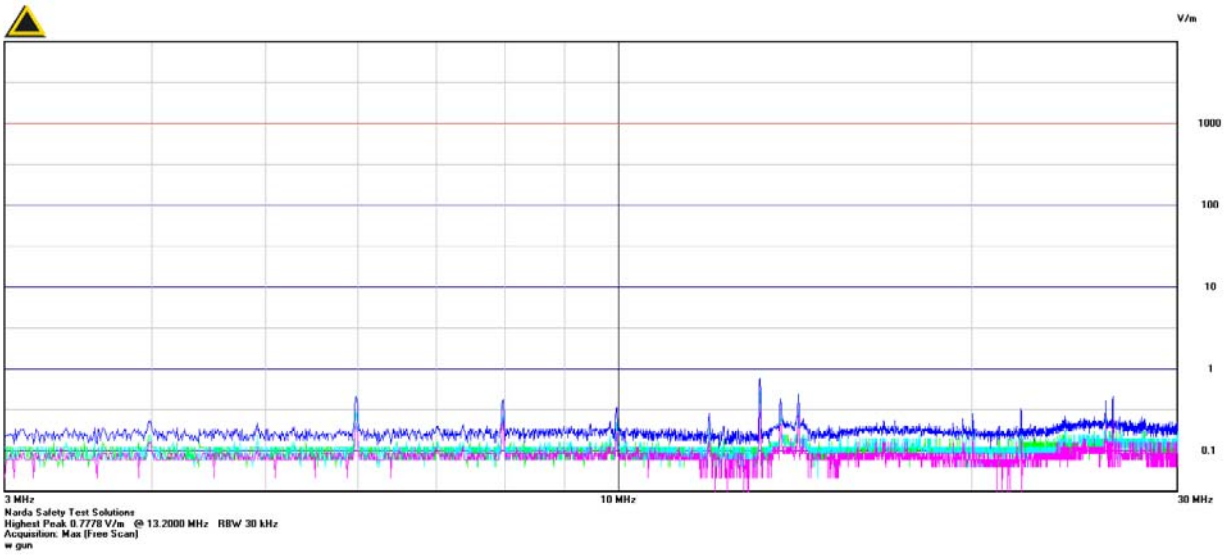
EUT on non-conductive table (sample pictures):

7.5 Measurement data EUT#1 (910 MHz unit)

E-field 1 MHz to 3 MHz, Test distance 10 cm:



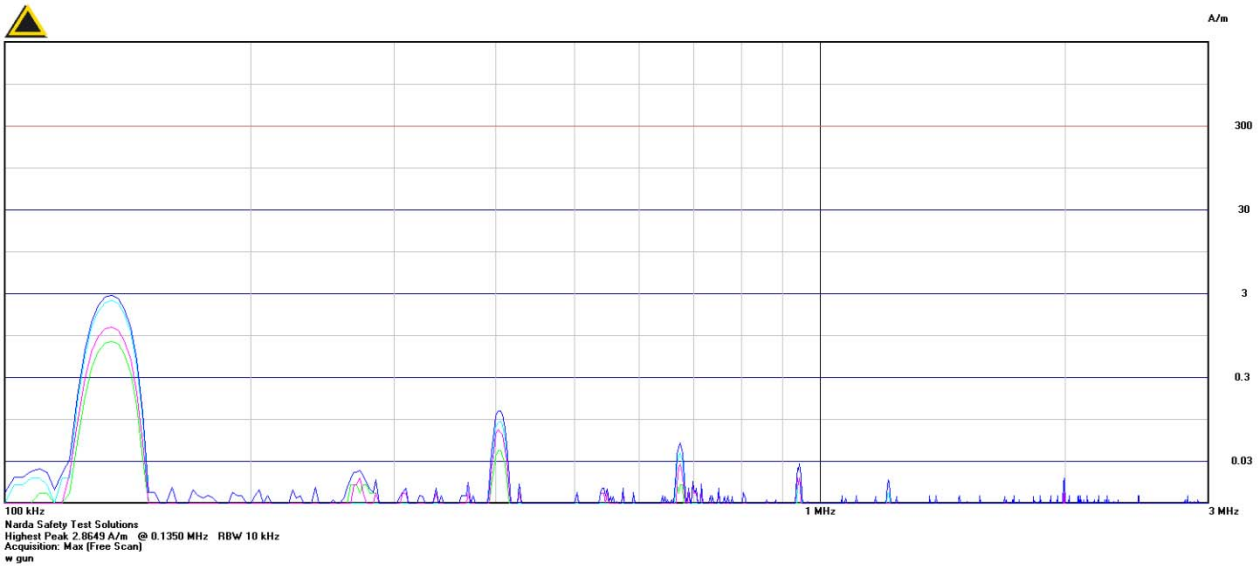
E-field 3 MHz to 30 MHz, Test distance 10 cm:



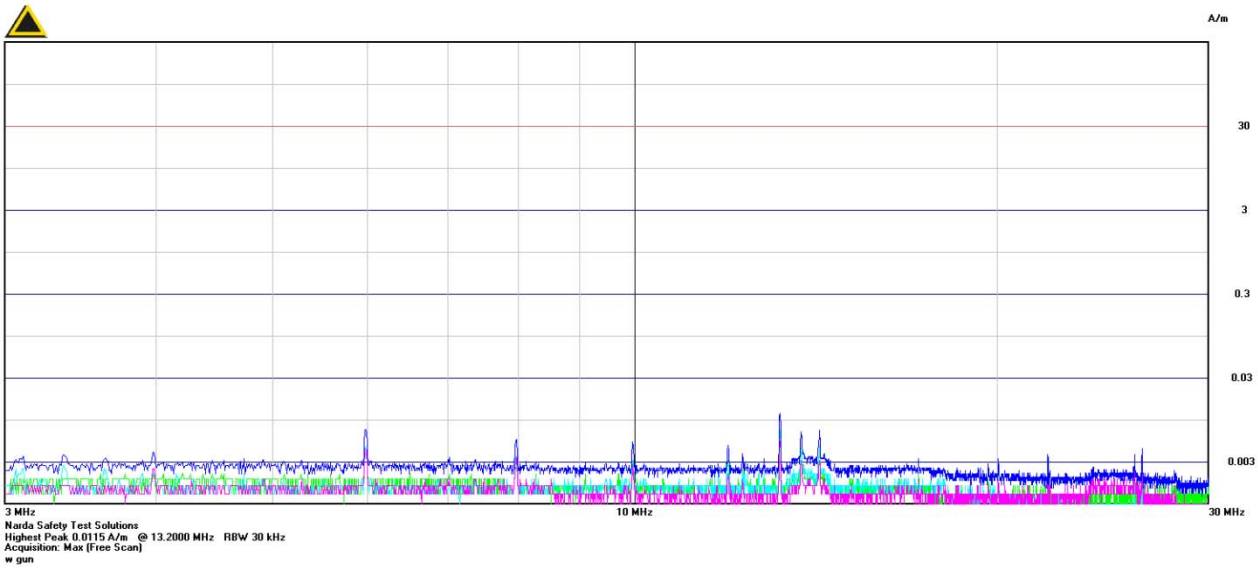
Data table:

Frequency (MHz)	E-field strength E_m (V/m)	E-field strength E_{mc} corrected with k = 1.22 (V/m)	RF Field strength limit E_{RL} (V/m)	$(E_{mc} / E_{RL})^2$
1.48	0.23	0.28	71.51	0.0000154
1.75	0.19	0.23	65.77	0.0000124
2.02	0.18	0.22	61.21	0.0000129
2.29	0.14	0.17	57.49	0.0000088
2.83	0.15	0.18	51.72	0.0000125
5.99	0.42	0.51	35.55	0.0002077
7.98	0.37	0.45	30.80	0.0002148
13.21	0.73	0.89	27.46	0.0010519
13.77	0.39	0.48	27.46	0.0003002
14.24	0.52	0.63	27.46	0.0005337
26.40	0.45	0.55	25.62	0.0004592
			Sum:	**0.0028296**

H-field 100 kHz to 3 MHz, Test distance 10 cm:



H-field 3 MHz to 30 MHz, Test distance 10 cm:



Data table:

Frequency (MHz)	H-field strength H_m (A/m)	H-field strength H_{mc} corrected with k = 1.22 (A/m)	RF Field strength limit H_{RL} (A/m)	$(H_{mc} / H_{RL})^2$
0.135	2.865	3.495	5.4074	0.4178226
0.400	0.125	0.153	1.8250	0.0069825
0.670	0.049	0.060	1.0896	0.0030101
5.99	0.007	0.009	0.1219	n.a.
13.21	0.011	0.013	0.0728	n.a.
13.75	0.008	0.010	0.0728	n.a.
14.24	0.008	0.010	0.0728	n.a.
			Sum:	**0.4278152**
Note: n.a. = not applicable, since emissions more than 40 dB below fundamental				

7.6 Test result

In all cases the multiple frequency summation is less than 1.

Manufacturer:	DATALOGIC S.r.l.
Model/Type:	BC9600-910 / CM9630
Serial No.:	EUT #1: B21P18140
Modifications:	None
Test date:	2022-02-24
Test personnel:	Reinhard Sauerschell, Daniel Körber

The EUT meets the requirements (up to 30 MHz) of this section.

Note: further evaluation for the whole applicable frequency range, especially including the wireless data transfer services (910 MHz) emissions, required.

8 NERVE STIMULATION ACCORDING TO RSS-102, SPR-002

Test requirement: RSS-102 Issue 5, Notice 2020 - DRS0012
Test procedure: IEEE C95.3, SPR-002 Issue 1

8.1 Regulation

RSS-102 Chapter 4 Exposure Limits
For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.[18]

[18] Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz* (hiip://www.hc-sc.gc.ca/ew h-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php).

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

8.2 Multiple frequency calculation

SPR-003 chapter 6.2 Basic Calculations:
The following calculations may be used to evaluate systems without consideration for the effects of phase resulting from multiple frequency and/or multiple antennas co-located in the measurement space, which may overestimate the actual result. If the result exceeds the limits, the advanced calculations described in Section 6.3 may be used.

Multiple frequency summation using the formulae according to SPR-002 chapter 6.2.1 and 6.2.2:

$$\Sigma (E_m / E_{RL}) \leq 1$$

where:
E_m = Measured electric field at a specific frequency
E_{RL} = Reference level limit for the electric field at the measurement frequency

$$\Sigma (H_m / H_{RL}) \leq 1$$

where:
H_m = Measured magnetic field at a specific frequency
H_{RL} = Reference level limit for the magnetic field at the measurement frequency

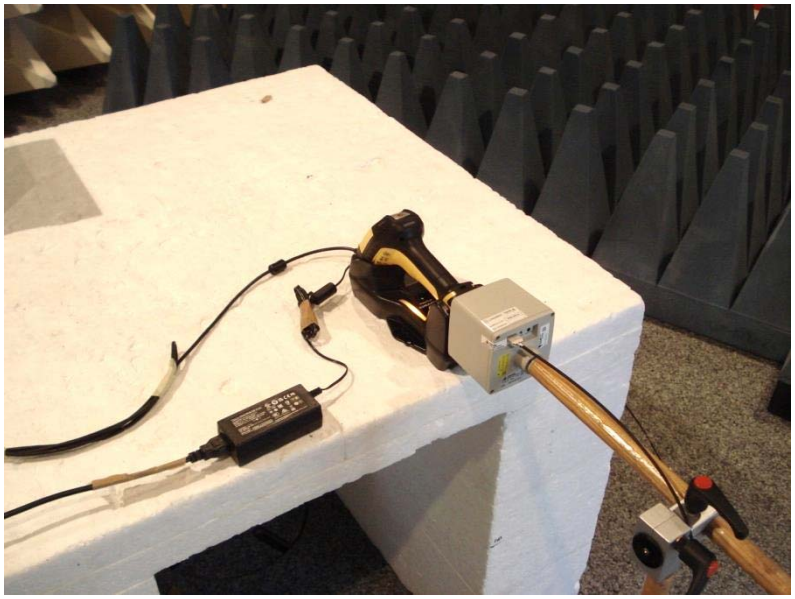
8.3 Test procedure

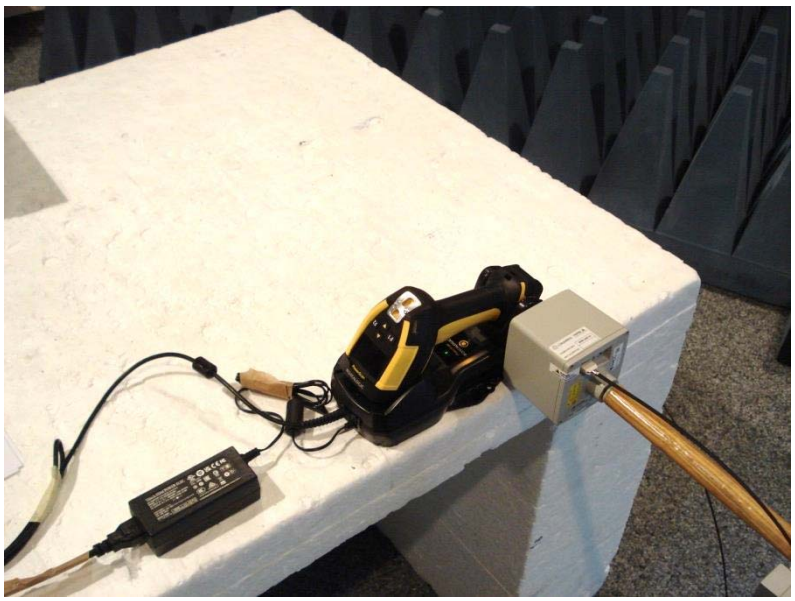
SPR-002 chapter 6.6.1.1 Measurement Method when the RBW of the Measurement Probe is greater than the 99% OBW or when using a Broadband Probe
When the RBW of the measurement probe is greater than the 99% OBW, or when using a broadband probe, use the following measurement method:
(a) Set the measurement frequency of the measurement probe to the fundamental frequency of the device under test.
(b) Set the span to encompass the entire emission bandwidth.
(c) Set the RBW greater than the 99% OBW of the fundamental emission.
Note: This step is not required for a broadband measurement probe that integrates the entire frequency range.
(d) Set the detector to Peak and trace display to Max-Hold.
(e) Allow the spectrum to fill; for pulsing devices this may require an increased monitoring period
(f) Using a marker, set it to the maximum level of the spectral envelope.
(g) Repeat steps (b) to (f) while scanning a parallel plane at the measurement distance on each side of the device to find the peak level.
(h) Repeat steps (b) to (g) for any frequencies where the field value is greater than -20 dBc below the maximum level identified.
(i) If there are multiple frequencies transmitted by the device under test, use equations (2) and (3) to determine compliance.
Note: When scanning around the entire device, the location found to be the maximum for the E- or H-field may not be the same location as the opposite field.

Measurement performed:
The EUTs were placed on a non-conductive table, and were operating as described above in chapter 2.5.
The electrical and magnetic field strength was measured at a distance of 0 cm from the EUT according to setup B, i.e. the probe was as close as possible at the surface of the EUTs.
The E-/H-sensors are two 3-axis isotropic probes, which allow frequency-selective measurements.
The measured frequency range is 3 kHz to 30 MHz, split into 3 frequency ranges according to the capabilities of the probes. The first probe covers the range 3 kHz to 100 kHz, the second probe covers the range 100 kHz to 30 MHz.
The complete surface of the EUTs, i.e. all 4 sides and top and bottom, were scanned with the field probes in order to detect the maximum emission level.

8.4 Pictures of setup

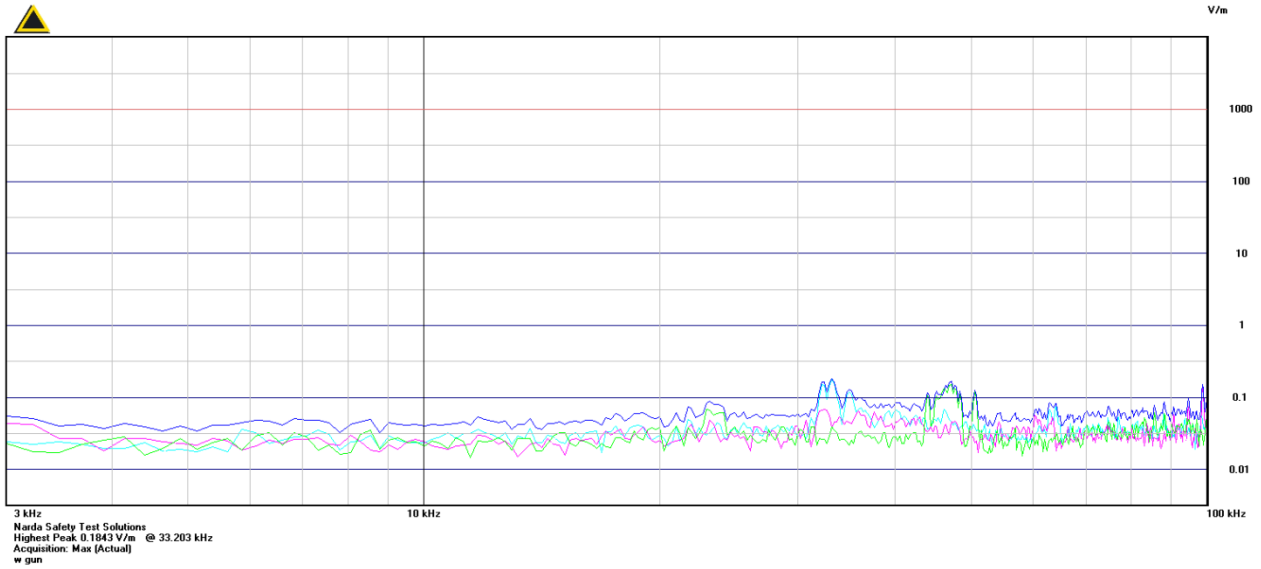
EUT on non-conductive table (sample pictures) with distance 0 cm



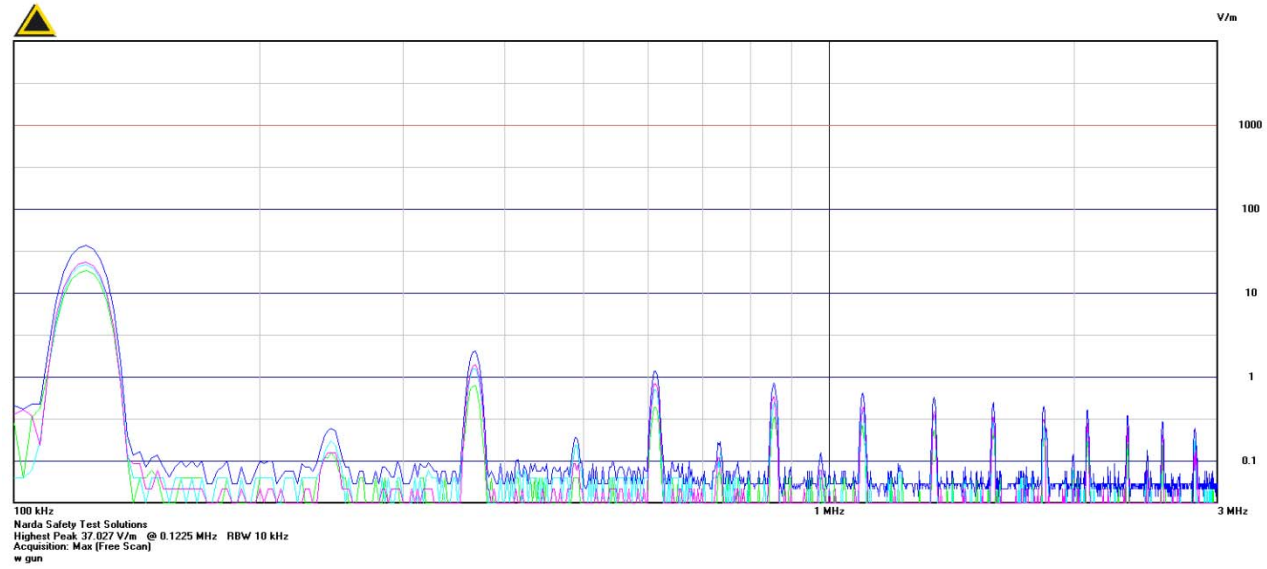


8.5 Measurement data EUT#1 (910 MHz unit)

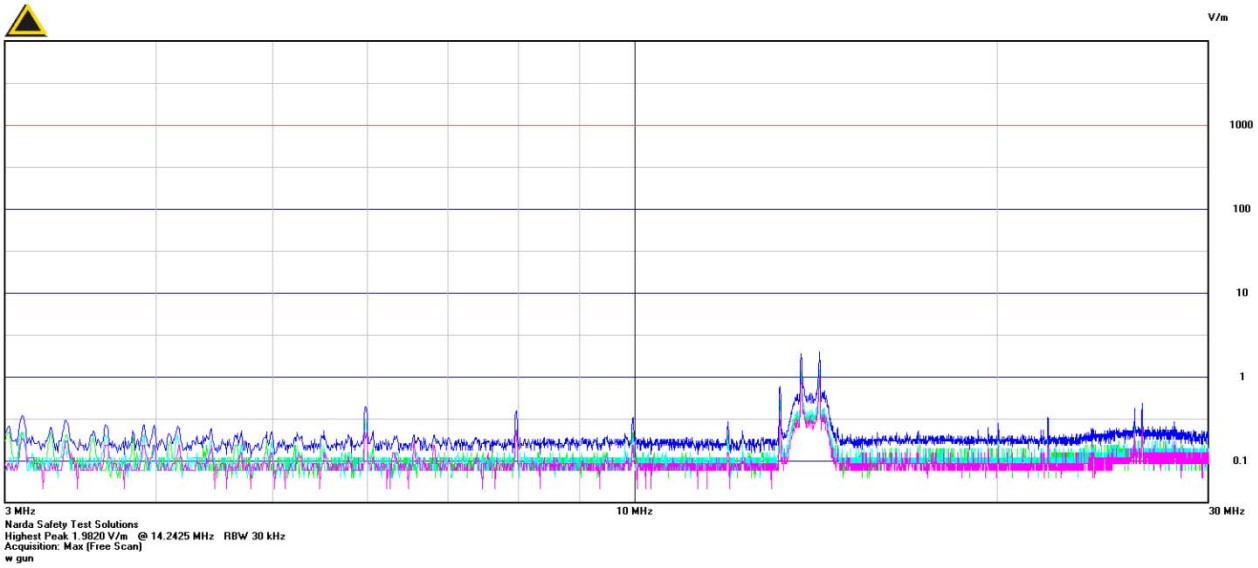
E-field 3 kHz to 100 kHz, Test distance 0 cm:



E-field 100 kHz to 3 MHz, Test distance 0 cm:



E-field 3 MHz to 30 MHz, Test distance 0 cm:

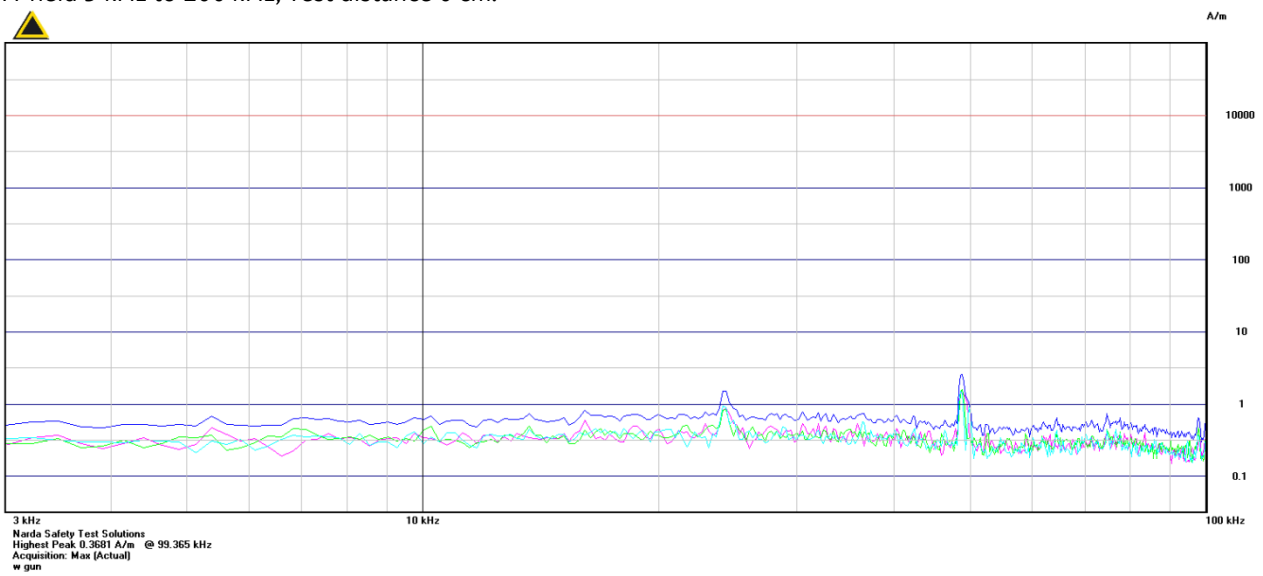


Data table:

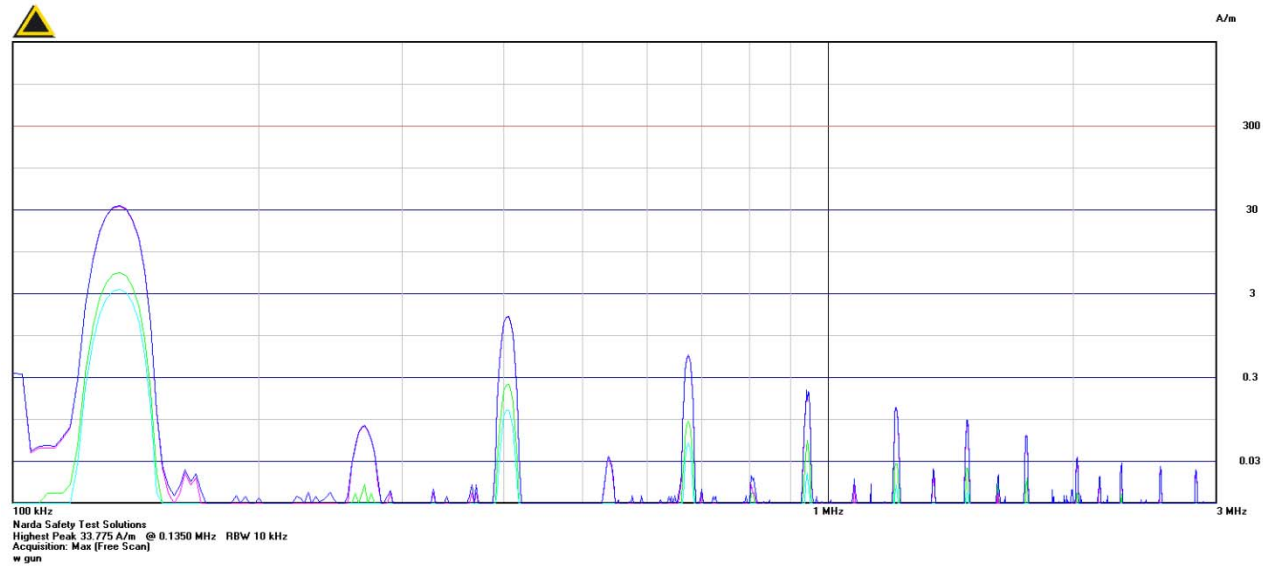
Frequency (MHz)	E-field strength E_m (V/m)	E-field strength E_{mc} corrected with k = 1.22 (V/m)	RF Field strength limit E_{RL} (V/m)	(E_{mc} / E_{RL})
0.123	37.03	45.18	83	0.544
0.368	2.06	n.a.	83	n.a.
0.610	1.17	n.a.	83	n.a.
			Sum:	**0.544**

Note: n.a. = not applicable, since E_m level below -20 dBc.

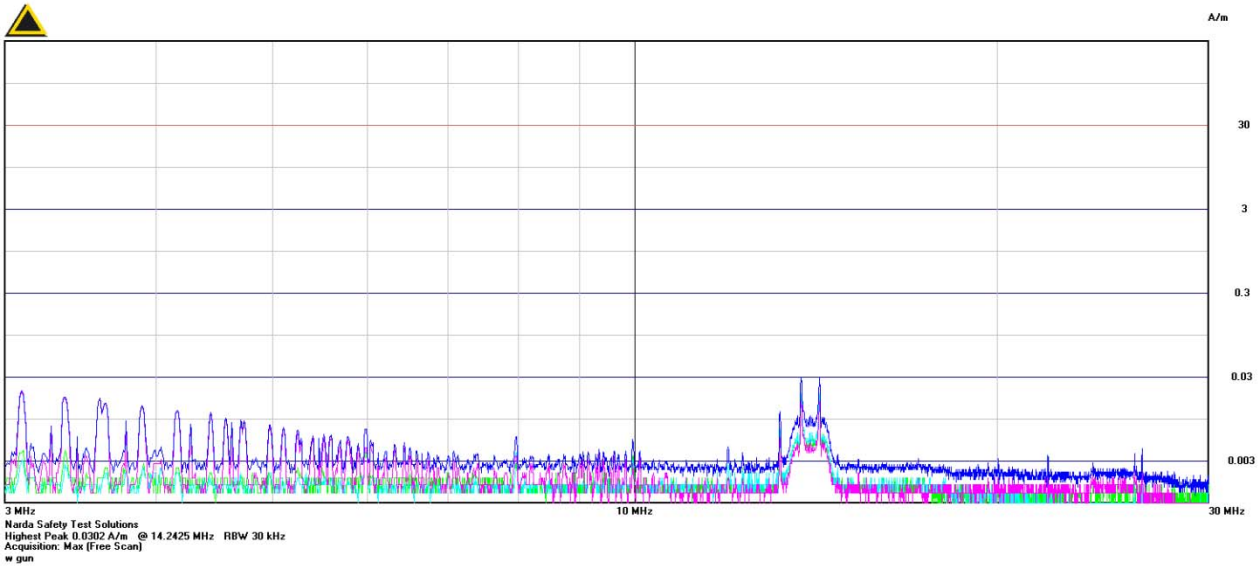
H-field 3 kHz to 100 kHz, Test distance 0 cm:



H-field 100 kHz to 3 MHz, Test distance 0 cm:



H-field 3 MHz to 30 MHz, Test distance 0 cm:



Data table:

Frequency (MHz)	H-field strength H_m (A/m)	H-field strength H_{mc} corrected with k = 1.22 (A/m)	RF Field strength limit H_{RL} (A/m)	(H_{mc} / H_{RL})
0.135	33.78	41.21	90	0.4579
0.403	1.59	n.a.	90	n.a.
0.673	0.56	n.a.	90	n.a.
			Sum:	**0.4579**

Note: n.a. = not applicable, since H_m level below -20 dBc.

8.6 Test result

In all cases the multiple frequency summation is less than 1.

Manufacturer:	DATALOGIC S.r.l.
Model/Type:	BC9600-910 / CM9630
Serial No.:	EUT #1: B21P18140; EUT
Modifications:	None
Test date:	2022-02-24
Test personnel:	Reinhard Sauerschell, Daniel Körber

The EUT meets the requirements of this section.

9 TEST INSTRUMENTS

Ident#	Instrument	Manufacturer	Type	Last Calibration	Calibration valid until
1129	UHF Log.Per. Antenna, Transc.	Schwarzbeck/CAR	UHALP 9107	2021-04	2023-04
1963	Loop Antenna	EMCC DR. RASEK	MAG 36-0.133R	2022-03	2025-03
3511	E-/H-Field-Analyser	Narda / PMM	EHP-50C	2020-03	2022-03
3831	Spectrum Analyzer	Rohde & Schwarz	FSU50	2021-11	2022-11
4480	E-/H-Field Analyzer	NARDA	EHP-200A	2020-10	2022-10
4522	Notebook	Dell	Latitude E6430	n/a	n/a
4717	Web-Thermo-Hygrobarograph	Wiesemann & Theis GmbH WUT	57613 Web-T/Rh/P	2021-07	2022-07
7523	Digital Storage Oscilloscope	Rohde & Schwarz	RTM3004	2022-01	2024-01

10 MEASUREMENT UNCERTAINTY

Measurement	Measurement uncertainty
H-field	± 1.6 dB
E-field	± 1.5 dB
Distances	± 0.5 cm

The reported uncertainty values are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of 95%.

The given values have been calculated on the basis of the following documents:

CISPR 16-4-2:2011+A1:2014, Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty.

JCGM 100:2008, Evaluation of measurement data - Guide to the expression of uncertainty in measurement.

11 LIST OF ANNEXES

The following annexes are separated parts from this test report.

Description	Pages
Annex 1: External photographs of equipment under test	4
Annex 2: Internal photographs of equipment under test	1
Annex 3: Photographs of ancillary equipment	3

ANNEX 1 TO TEST REPORT # EMCC-960704.6JB, 2022-05-19

EXTERNAL PHOTOGRAPHS OF EQUIPMENT UNDER TEST

EQUIPMENT UNDER TEST:

Trade Name:	DATALOGIC
Model/ Type:	BC9600-910 / CM9630
Serial Number(s):	B21P18140
Application:	Charging Stand
FCC:	U4FBC9600
IC:	3862D-BC9600
Manufacturer	DATALOGIC S.r.l.
Customer:	PRS LAB S.R.L. UNIPERSONALE
Address:	Via Campagna, 92 22020 Faloppio (CO) ITALY
Phone:	+39 031 3500011
E-Mail:	rpfeiffer@primaricerca.it
Relevant Standard(s):	47 CFR §1.1310, RSS-102 Issue 5
Measurement Procedure:	KDB680106 D01, SPR-002 Issue 1

ILLUSTRATION LIST ANNEX 1

Photograph A1-1: Charging stand EUT #1

Photograph A1-2: Charging stand EUT #1, label

Photograph A1-3: Charging stand EUT #1, label

Photograph A1-4: Reader in charging stand EUT #1

Photograph A1-5: Label of reader used with charging stand EUT #1

ANNEX 2 TO TEST REPORT # EMCC-960704.6JB, 2022-05-19

INTERNAL PHOTOGRAPHS OF EQUIPMENT UNDER TEST

EQUIPMENT UNDER TEST:

Trade Name:	DATALOGIC
Model/ Type:	BC9600-910 / CM9630
Serial Number(s):	B21P18140
Application:	Charging Stand
FCC:	U4FBC9600
IC:	3862D-BC9600
Manufacturer:	DATALOGIC S.r.l.
Customer:	PRS LAB S.R.L. UNIPERSONALE
Address:	Via Campagna, 92 22020 Faloppio (CO) ITALY
Phone:	+39 031 3500011
E-Mail:	rpfeiffer@primaricerca.it
Relevant Standard(s):	47 CFR §1.1310, RSS-102 Issue 5
Measurement Procedure:	KDB680106 D01, SPR-002 Issue 1

none

ANNEX 3 TO TEST REPORT # EMCC-960704.6JB, 2022-05-19

PHOTOGRAPHS OF EUT PERIPHERALS/SIMULATORS

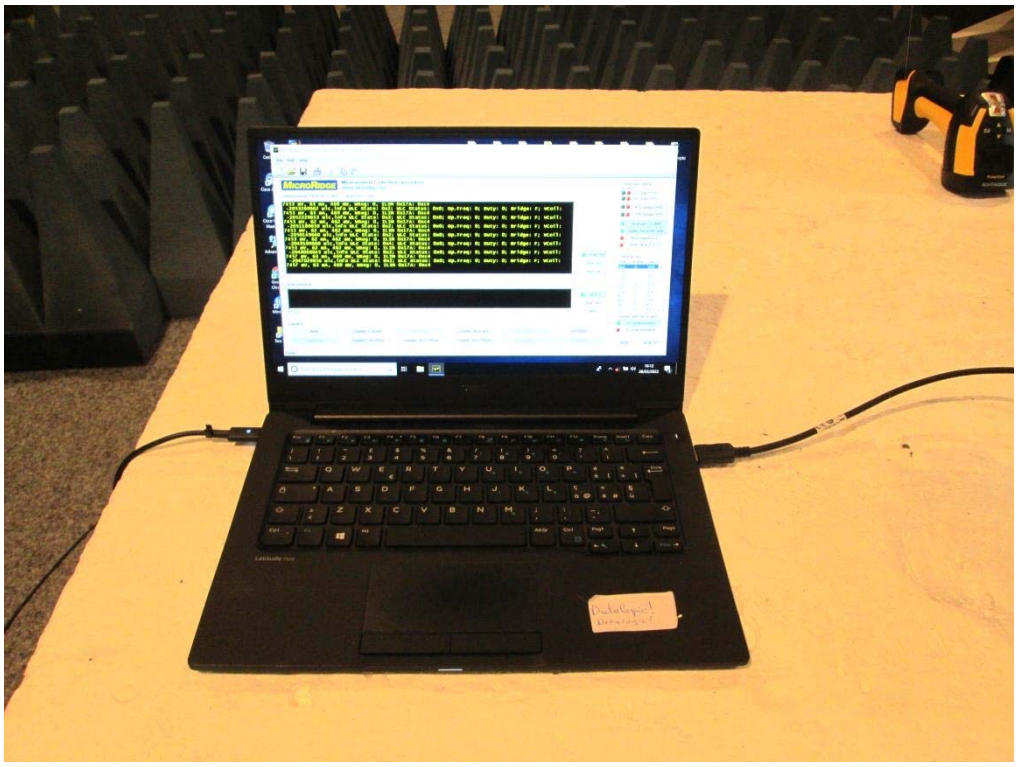
EQUIPMENT UNDER TEST:

Trade Name:	DATALOGIC
Model/ Type:	BC9600-910 / CM9630
Serial Number(s):	B21P18140
Application:	Charging Stand
FCC:	U4FBC9600
IC:	3862D-BC9600
Manufacturer:	DATALOGIC S.r.l.
Customer:	PRS LAB S.R.L. UNIPERSONALE
Address:	Via Campagna, 92 22020 Faloppio (CO)
Phone:	+39 031 3500011
E-Mail:	rpfeiffer@primaricerca.it
Relevant Standard(s):	47 CFR §1.1310, RSS-102 Issue 5
Measurement Procedure:	KDB680106 D01, SPR-002 Issue 1

ILLUSTRATION LIST ANNEX 3

Photograph A3-1: Power supply

Photograph A3-2: Label of power supply



Photograph A3-3: PC for operating and observation

Photograph A3-4: Label of PC