RF Exemption Report

Manufacturer: LEGO System A/S
Model: SENSOR COLOUR NO. 3

Add value.
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In accordance with Article 6-1 of the Enforcing Ordinance of the Japan Radio Law (Extremely Low-Power Devices)

Prepared for: LEGO System A/S
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COMMERCIAL-IN-CONFIDENCE

Document 75962745-07 Issue 01

SIGNATURE			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Matthew Russell	Chief Engineer	Authorised Signatory	08 April 2025

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY
The wireless devices described within this report are compliant with the exemption criteria related to Article 6-1 of the Enforcing Ordinance for Extremely Low-Power Devices (ELPs).

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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	08-Apr-2025

Table 1

1.2 Introduction

Applicant	LEGO System A/S
Manufacturer	LEGO System A/S
Model Number(s)	SENSOR COLOUR NO. 3
Serial Number(s)	CS_EP2-0086
Hardware Version(s)	EP2
Software Version(s)	0.3.1
Number of Samples Tested	1
Test Specification/Issue/Date	Article 6-1 of the Enforcing Ordinance of the Japan Radio Law (Extremely Low-Power Devices)
Order Number	7000395236
Date	15-October-2024
Date of Receipt of EUT	20-January-2025
Start of Test	06-February-2025
Finish of Test	06-February-2025
Name of Engineer(s)	Pier-Angelo Lorusso

1.3 Brief Summary of Results

The electric field intensity measured for the equipment under test within this report was confirmed to be less than the level as stated in section 2.1 and therefore is not subject to mandatory third-party approval requirements.

1.4 Application Form

Type of Equipment

Fixed Station ☐	Transmitter ☐ Receiver ☐	Simplex ☐ Duplex ☐	Integral Antenna ☐
			Single Antenna ☐
Mobile Station ☐	Transceiver ☐ Battery Charger ☐		Two Antenna Connector ☐
			Multiple Antenna Connectors ☐ Number:
Portable Station ☒			
Transponder (Tag) ☐	Active ☐ Passive ☒		

Transmitter Technical Characteristics

Product Class*: (See ETSI EN 300 330 Subclause B.2.)*	Class 1

Transmitter Technical Characteristics – Antenna Characteristics

For Class 1 Equipment - Average area for the loop:	0.04 m^2 *(See Note 1)*
~~For Class 2 and 3 Equipment - Maximum current in the loop:~~	~~Click to edit~~ ~~Amps~~

Transmitter Technical Characteristics – Frequency Characteristics

Transmitter frequency alignment range: *(See Note 2)*	13.56 MHz
Channel separation (if applicable): *(See Note 3)*	N/A
State the maximum number of channels over which the equipment can operate:	1

Notes
(1) The Area of the loop is the physical area and does not take into account the number of turns.
(2) The alignment range is the frequency range over which the receiver or the transmitter can be programmed and/or realigned to operate, without any physical change to components other than programmable read only memories or crystals (for the receiver or transmitter).
(3) The switching range is the maximum frequency range over which the receiver or the transmitter can be operated without reprogramming or realignment.

Transmitter Modulation

Amplitude ☒	Frequency ☐	Phase ☐	Other ☐	Please Detail:

~~AC Power Source~~

~~Supply frequency:~~		~~Hz~~		~~V~~	~~Max current:~~		~~A~~
~~Single phase ☐ Three phase ☐~~							

~~DC Power Source~~

~~Nominal voltage:~~	~~V~~
~~Extreme upper voltage:~~	~~V~~
~~Extreme lower voltage:~~	~~V~~
~~Max current:~~	~~A~~

Battery Power Source

Voltage:	3.85	V
Test Voltage	3.01	V
End-point Voltage:	3.0	V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☒ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Temperature *(over which equipment is to be type tested)*

Declared by the provider ☐:	°C to °C
Category I (General) ☐	-20°C to +55°C
Category II (Portable equipment) ☐	-10°C to +55°C
Category III (Equipment for normal indoor use) ☒	+0°C to +35°C

Automatic Equipment Switch Off

If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.
Applies ☒ Cut off voltage: 3.0V
Does not apply ☐

Channel Identification

Each equipment, whether one or more submitted for tests shall carry clear identification (such as a serial number), together with the frequencies associated with the channel identification displayed on the equipment.			
Equipment Identification *(eg Serial Number)*	Channel Number	Transmit Nominal Frequency (MHz)	Receive Nominal Frequency (MHz)
Test Unit number		13.56	13.56

The above information was provided by the applicant.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 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
Model: SENSOR COLOUR NO. 3, Serial Number: CS_EP2-0086			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 2

1.7 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: 13.56 MHz NFC - Transmit		
Assessment of Electric Field Intensity	Pier-Angelo Lorusso	None

Table 3

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Assessment Details

2.1 Technical Requirements

When the level of the electric field intensity (the strength of the radio wave) within 3 meters of the radio equipment is under the level shown in the following figure, there is no need for getting a license from the radio station.

There is no restriction on the frequency or the purpose.

【 Figure: Tolerance of the Electric field Intensity of the Extremely Low Power Radio Station at the distance of 3m 】

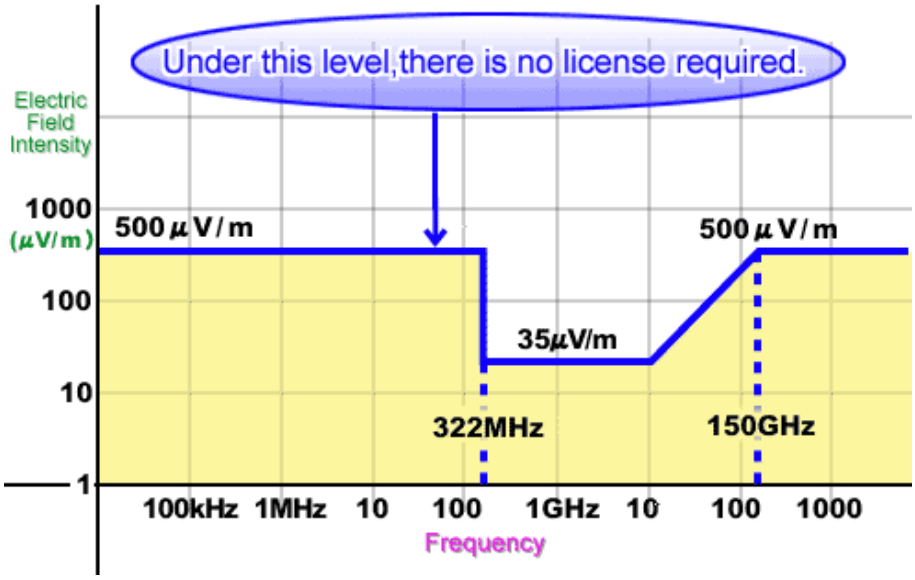


Figure 1

When the level of the electric field intensity (the strength of the radio wave) within 500 meters of the radio equipment is less than 200μV/m, and the frequency and the other factors associated with the wireless microphone or the remote-operated radio control as regulated and notified by the Ministry of Internal Affairs and Communications, there is no need for getting a license for the radio station.

2.2 Assessment of Electric Field Intensity

2.2.1 Specification Reference

Article 6-1 of the Enforcing Ordinance of the Japan Radio Law (Extremely Low-Power Devices)

2.2.2 Equipment Under Test and Modification State

SENSOR COLOUR NO. 3, S/N: CS_EP2-0086 - Modification State 0

2.2.3 Date of Test

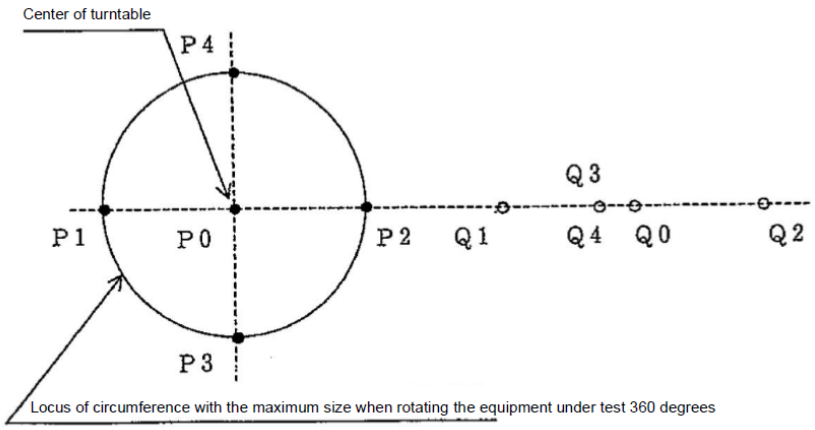
06-February-2025

2.2.4 Test Method

This test was performed in accordance with the test method requirements of Ministry of Posts and Telecommunications Notification No. 127 (25 February 1988), last modified by Ministry of Internal Affairs and Communications Notification No. 172 (28 March 2006).

The equipment under test was placed on a non-conductive support at a height of 0.8m within a semi-anechoic chamber. The measurement antenna was placed at a test distance of 3m.

The measurement antenna was connected to an EMI Test Receiver. The cable loss and antenna correction factor was entered as an offset on the test receiver. The equipment under test was rotated 360 degrees with the measurement antenna in horizontal polarisation. The maximum observed field strength was recorded and then the test was repeated with the measurement antenna in vertical polarisation.



Note 1: P0, P1, P2, P3, and P4 shall indicate the positions of a transmitting antenna, and their corresponding positions of a measurement antenna shall be Q0, Q1, Q2, Q3, and Q4.
Note 2: The distances between P0 and Q0, P1 and Q1, P2 and Q2, P3 and Q3, and P4 and Q4 shall be 3m.

Figure 2 – Arrangement of EUT and Measurement Antenna

For frequencies less than 15 MHz, the following correction factor shall be applied:

24 – (20 * log (f)) dB, where f is frequency in MHz.

2.2.5 Environmental Conditions

Ambient Temperature	20.2 °C
Relative Humidity	33.8 %

2.2.6 Test Results

13.56 MHz NFC – Transmit

Frequency (MHz)	Electric Field Strength at 3m (dBµV/m)	Correction Factor (dB)*	Corrected Field Strength at 3m (dBµV/m)	Corrected Field Strength at 3m (µV/m)	Exemption Limit (µV/m)	Verdict (Pass/Fail)
13.560	55.28	-1.35	53.93	496.89	500.00	Pass

Table 4

*Not applicable for frequencies above 15 MHz.

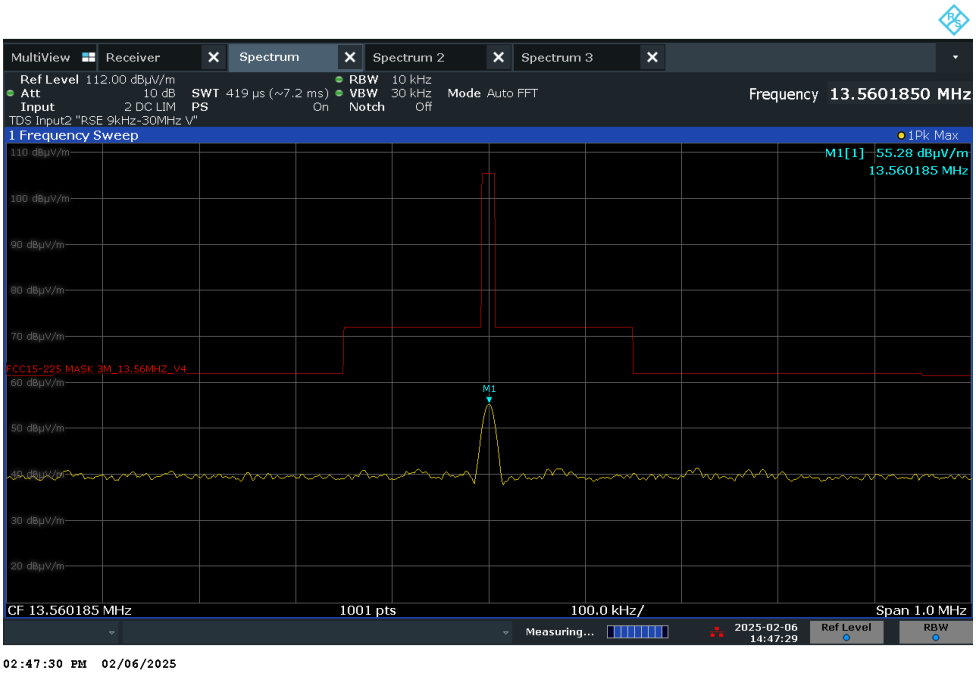


Figure 3 – Measurement Result

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
HygroPalm	Rotronic	HygroPalm 0	3484	12	13-Sep-2025
3m Semi-Anechoic Chamber	Rainford	RF Chamber 11	5136	36	14-Nov-2027
Mast and Turntable Controller	Maturo	Maturo NCD	5159	-	TU
Turntable	Maturo	TT 15WF	5160	-	TU
Test Receiver	Rohde & Schwarz	ESW44	5382	12	09-Sep-2025
Cable (SMA to SMA, 2 m)	Junkosha	MWX221-02000AMSAMS/A	5518	12	18-Apr-2025
Antenna (Loop, 9 kHz to 30 MHz)	Teseq	HLA 6121	5616	24	16-Aug-2026
Cable (N to N 8m)	Junkosha	MWX221-08000NMSNMS/B	6330	6	17-Feb-2025

Table 5

TU - Traceability Unscheduled

3 Photographs

3.1 Equipment Under Test (EUT)

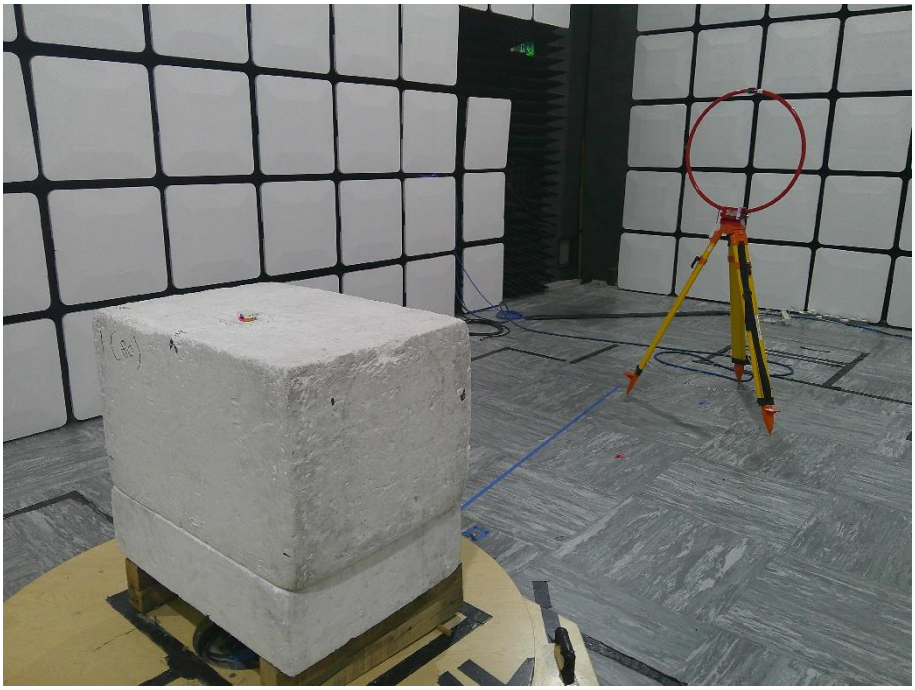


Figure 4 – Below 30MHz Front on

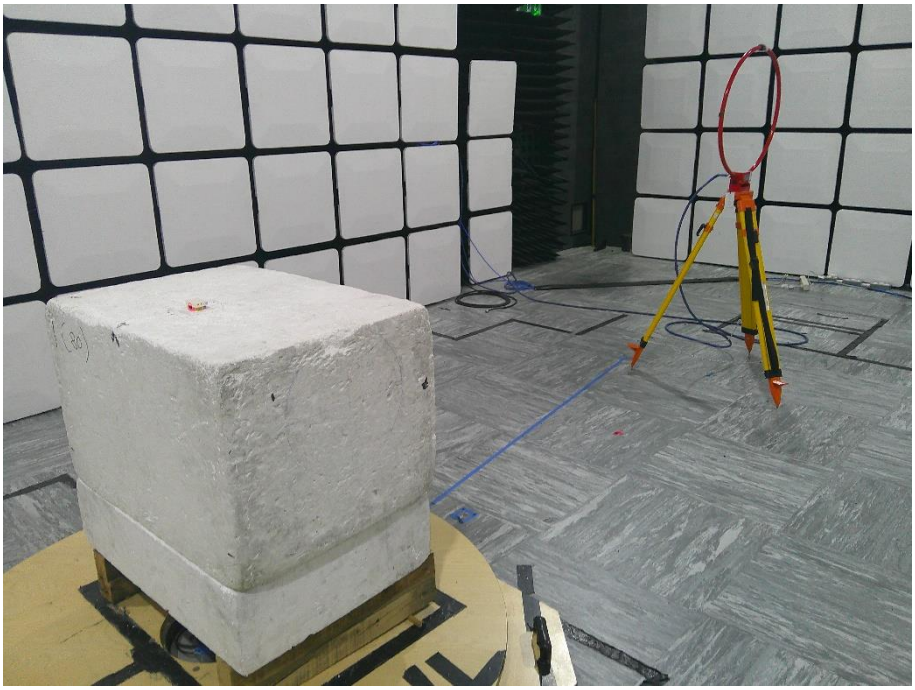


Figure 5 – Below 30MHz Side on

4 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Assessment of Electric Field Intensity	9 kHz to 30 MHz: ± 3.4 dB 30 MHz to 1 GHz: ± 5.2 dB

Table 6

Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.