Report on the FCC and IC Testing of the KEBA Industrial Automation GmbH

Model: KeTop CB410-SE2

In accordance with FCC 47 CFR Part 1.1310 and ISED RSS-102, Issue 5, section 2.5 and ISED RSS-GEN Issue 5, section 3.4

Prepared for: KEBA Industrial Automation GmbH
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Product Service

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COMMERCIAL-IN-CONFIDENCE

Date: 2022-05-23
Document Number: TR-76967-36510-17 | Issue: 02

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Michael Ingerl	2022-05-23	SIGN-ID 653225
Authorised Signatory	Markus Biberger	2022-05-23	SIGN-ID 653286

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 1.1310 &
ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	
Testing	Michael Ingerl	2022-05-23	SIGN-ID 653226

Laboratory Accreditation	Laboratory recognition	ISED Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02 DAkkS Reg. No. D-PL-11321-11-03	Registration No. BNetzA-CAB-16/21-15	3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 1.1310 and ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5

Contains FCC ID: U870009 and IC: 20800–WALR1MOD

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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	2022-03-15
2	Added information at chapter 2.1.4 and added FCC ID and IC at front page.	2022-05-23

Table 1

1.2 Introduction

Applicant	KEBA Industrial Automation GmbH
Manufacturer	KEBA Industrial Automation GmbH
Model Number(s)	KeTop CB410-SE2
Serial Number(s)	---
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 1.1310 and ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5
Test Plan/Issue/Date	---
Order Number	5487767
Date of Receipt of EUT	2022-01-19
Start of Test	2022-01-26
Finish of Test	2022-02-10
Name of Engineer(s)	Michael Ingerl
Related Document(s)	KDB 447498 D01 General RF Exposure Guidance v06 ANSI C63.10 (2013)

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 1.1310 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: 24 V DC power supply – Transmitting continuously on RFID, Wifi 2,4GHz, Wifi 5GHz, WAL and Bluetooth				
2.1	1.1310	Exposure of Humans to RF Fields	Pass	KDB 447498 D01 v06

Table 2

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1.4 Basic information of EUT

Equipment characteristics			
Type designation: Type of equipment:	KeTop CB410-SE2 KeTop Safe wireless system		
Application[1]: Equipment class: Kind of equipment	Inductive Applications, Wideband transmission systems Equipment for fixed use Transceiver		
Frequency band[1]: Frequency range:	9 j 13,553 - 13,567 MHz (Only a RFID tag)	3 b 2400 – 2483,5 MHz	14 e1 and e2 5150-5350 MHz and 5470-5725 MHz
Antenna:	Integrated Antenna		
Standby mode:	Not Applicable		

[1] Classification according to CEPT/ERC Recommendation 70-03

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1.5 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 SN: ---	Not Applicable	Not Applicable

Table 3

1.6 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 power supply – Transmitting continuously on RFID, Wifi 2,4GHz, Wifi 5GHz, WAL and Bluetooth	
Exposure of Humans to RF Fields	Michael Ingerl

Table 4

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Details

2.1 Exposure of Humans to RF Fields

2.1.1 Specification Reference

FCC 47 CFR Part 1.1310 and
ISED RSS-GEN Issue 5, section 3.4 and
ISED RSS-102, Issue 5, section 2.5 and
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

2.1.2 Equipment Under Test and Modification State

KeTop CB410-SE2, S/N: --- - Modification State 0

2.1.3 Date of Test

2022-01-26 – 2022-02-10

2.1.4 Evaluation Results

acc. to KDB 447498 D01:

Maximum Radiated Power (EIRP) Pmax:	0.94 mW (See at TR-76967-36510-16, section 2.1)
Compliance Boundary d:	1 mm
Frequency f:	2405 MHz = 2.405 GHz
Numeric Threshold (Pmax / d) $(f)^{0.5}$	1.458
Numeric Threshold Limit (1 g SAR):	3.0

Maximum Radiated Power (EIRP) Pmax:	0.21 mW (See at TR-76967-36510-16, section 2.1)
Compliance Boundary d:	1 mm
Frequency f:	5186 MHz = 5.186 GHz
Numeric Threshold (Pmax / d) $(f)^{0.5}$	0.478
Numeric Threshold Limit (1 g SAR):	3.0

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ISED RSS-GEN Issue 5, section 3.2 and ISED RSS-102, Issue 5, section 2.5 :

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
☐ detachable				
The conducted output power (CP in watts) is measured at the antenna connector: CP =			☐	
The effective isotropic radiated power (EIRP in watts) is calculated using				
☐ the numerical antenna gain: G =		☐		
$EIRP = G \cdot CP \Rightarrow EIRP$ =				
☐ the field strength[2] in V/m: FS = ... V/m			☐	
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = mW				
with:				
Distance between the antennas in m: D = mm		☐		
☒ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by: $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = 0.94 mW (2405 MHz) = 0.21 mW (5186 MHz)				
with:				
Field strength in V/m: FS = 0.17 (2405 MHz) (See at TR-76967-36510-16, section 2.1) = 0.08 (5186 MHz) (See at TR-76967-36510-16, section 2.1)			☒	
Distance between the two antennas in m: D = 3			☒	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): TP = 0.94 mW (2405 MHz) TP = 0.21 mW (5186 MHz)				

[2] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

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SAR evaluation														
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required. For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.													
Frequency (MHz)	Exemption limits (mW)[3] at separation distance of													
	≤5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	≥50 mm				
450	52	70	88	106	123	141	159	177	195	213				
835	17	30	42	55	67	80	92	105	117	130				
1900	7	10	18	34	60	99	153	225	316	431				
2450	4	7	15	30	52	83	123	173	235	309				
3500	2	6	16	32	55	86	124	170	225	290				
5800	1	6	15	27	41	56	71	85	97	106				
Carrier frequency:			*f*	=	2405 MHz			5186 MHz						
Distance:			*d*	=	1 mm			1 mm				☒		
Transmitter output power:			*TP*	=	0.94 mW			0.21 mW						
Limit:			TP_{limit}	=	4.00 mW			1.00 mW						☒

[3] The exemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separaton distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

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3 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	±1.14 %	2
RF-Frequency error	1.96	±1 · 10-7	7
RF-Power. conducted carrier	2	±0.079 dB	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power. conducted. spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power. radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density. conducted	2.0	±0.53 dB	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2.89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2.89 %	2
Adjacent channel power 25 MHz – 1 GHz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Table 5

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 6

Product Service

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 7

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 kp = 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 kp = 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 kp = 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 kp = 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 kp = 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 kp = 1.96. providing a level of confidence of p = 95.45%
Note 8:
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 kp = 1.96. providing a level of confidence of p = 95.45%