Honeywell Safety and Productivity Solutions

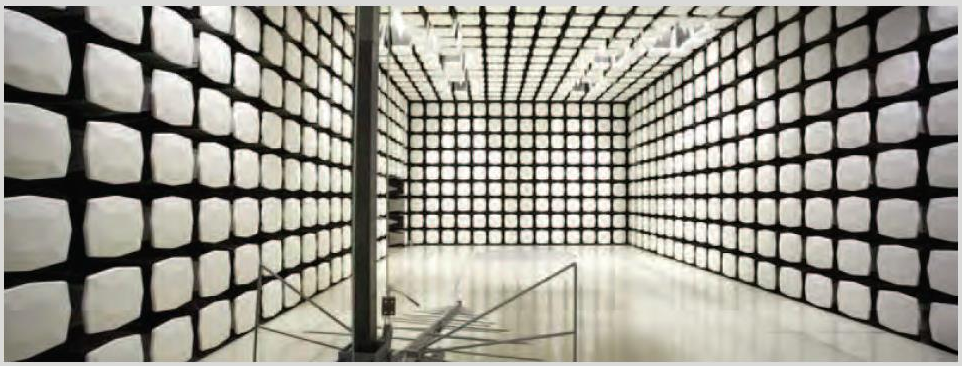
CN80L0N with IP30C

FCC 2.1091:2019

802.11, Bluetooth/BLE, Zigbee, 13.56 MHz NFC in CN80L0N

900 MHz RFID, Bluetooth in IP30C

Report: INMC1108.1



NVLAP Lab Code: 200630-0

CERTIFICATE OF EVALUATION

Last Date of Evaluation: Wednesday, May 27, 2020
Honeywell Safety and Productivity Solutions
EUT: CN80L0N with IP30C

RF Exposure Evaluation

Standards

Specification	Method
FCC 2.1091:2020	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Description	Applied	Results	Comments
7.2	Maximum Permissible Exposure	Yes	Pass	None

Deviations From Evaluation Standards

None

Approved By:

Donald Facteau, Process Architect

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

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Korea

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NCC - Recognized by NCC as a CAB for the acceptance of test data.

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SCOPE

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FACILITIES

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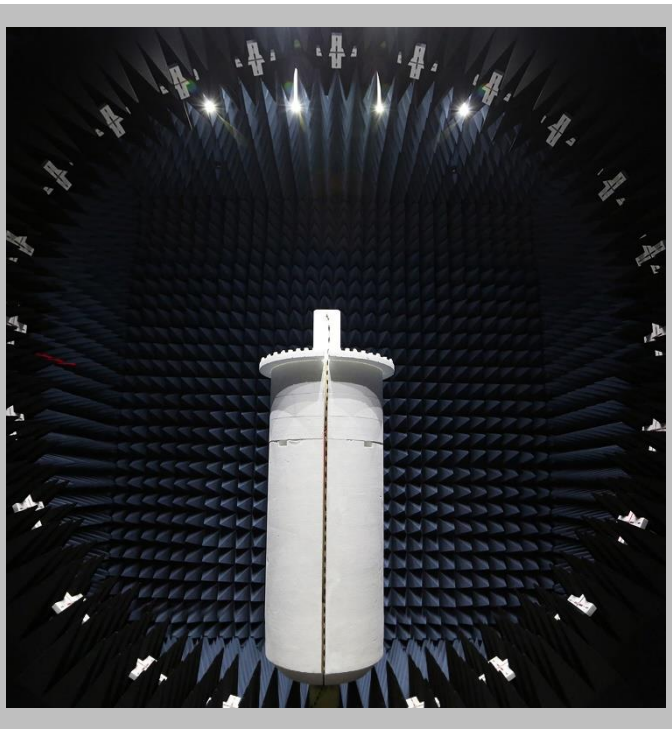
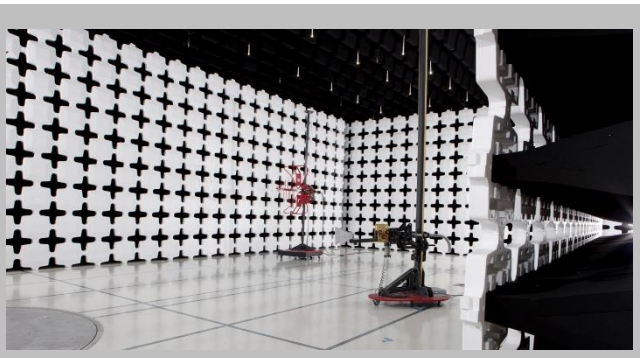
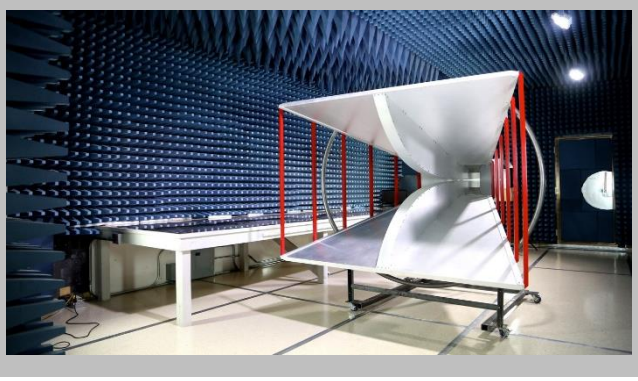
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







PRODUCT DESCRIPTION

Client and Equipment Under Evaluation Information

Company Name:	Honeywell Safety and Productivity Solutions
Address:	16201 25th Ave W
City, State, Zip:	Lynnwood, WA 98087
Evaluation Requested By:	Sean MacKellar
EUT:	CN80L0N with IP30C
Date of Evaluation:	Wednesday, May 27, 2020

Information Provided by the Party Requesting the Evaluation

Functional Description of the Equipment:
The IP30C is a handheld RFID reader that attaches to the back of the Honeywell Model: CN80L0N mobile computer. The Intermec IM11 is a previously certified RFID module (FCC ID:EHA-IM11) that is installed in the Intermec IP30C handheld RFID reader. The IP30C also contains a BlueGiga WT12 Bluetooth module (FCC ID:QOQWT12) used to communicate the data read by the IM11 to the Honeywell Model: CN80L0N mobile computer. CN80L0N mobile computer contains a 13.56 MHz NFC, a Bluetooth/Bluetooth Low Energy radio, and an 802.11 radio.

Objective:
To demonstrate compliance with FCC requirements for RF exposure for 2.1091 mobile/fixed devices

RF Exposure Condition

The following RF Exposure conditions were used for the assessment documented in this report:	
Intended Use	Mobile (A SAR test exclusion assessment for portable use of the same radios is documented in Element report INMC1108.4.)
Location on Body (if applicable)	NA
How is the Device Used	Information from the RFID module is communicated to the handheld computer via a Bluetooth radio to a handheld computer. The handheld computer can communicate to the outside world by an 802.11 radio, a Bluetooth radio, or a Bluetooth Low Energy Radio.
Radios Contained in the Same Host Device	IP30C contains: 900 MHz RFID, FCC ID:EHA-IM11 Bluetooth, FCC ID:QOQWT12 CN80L0N mobile computer (FCC ID:HD5-CN80L0N) contains: 802.11 (supports b/g/a/n – referred to as 802.11 here) Bluetooth / Bluetooth Low Energy Zigbee 13.56 MHz NFC (exempt from evaluation)
Simultaneous Transmitting Radios	CN80L0N 802.11, IP30C 900 MHz RFID, IP30C Bluetooth Or CN80L0N Bluetooth, IP30C Bluetooth, IP30C 900 MHz RFID, Or CN80L0N Bluetooth Low Energy, IP30C Bluetooth, IP30C 900 MHz RFID Or CN80L0N Zigbee, IP30C Bluetooth, IP30C 900 MHz RFID
Body Worn Accessories	None
Environment	General Population/Uncontrolled Exposure

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

element
EXRPT.2019.10.07

OVERVIEW

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons. ANSI C95.1:2005 + Amd 1:2010 specifies a minimum separation distance of 20 cm for performing reliable field measurements to determine adherence to MPE limits. If the minimum separation distance between a transmitter and nearby persons is more than 20 cm under normal operating conditions, compliance with MPE limits may be determined at such distance from the transmitter. When applicable, operation instructions and prominent warning labels may be used to alert the exposed persons to maintain a specified distance from the transmitter or to limit their exposure durations and usage conditions to ensure compliance. If the use of warning labels on a transmitter is not effective or desirable, the alternative of performing SAR evaluation with the device at its closest range to persons under normal operating conditions may be used. The field strength and power density limits adopted by the FCC are based on whole-body averaged exposure and the assumption of RF field levels relate most accurately to estimating whole-body averaged SAR. This means some local values of exposures exceeding the stated field strength and power density limits may not necessarily imply non-compliance if the spatial average of spatially averaged RF fields over the exposed portions of a person's body does not exceed the limits.

COMPLIANCE WITH FCC 2.1091

"Mobile devices that operate in the Cellular Radiotelephone Service, the Personal Communications Services, the Satellite Communications Services, the General Wireless Communications Service, the Wireless Communications Service, the Maritime Services and the Specialized Mobile Radio Service authorized under subpart H of part 22 of this chapter, parts 24, 25, 26 and 27 of this chapter, part 80 of this chapter (ship earth stations devices only) and part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more. Unlicensed personal communications service devices, unlicensed millimeter wave devices and unlicensed NII devices authorized under §§15.253, 15.255, and 15.257, and subparts D and E of part 15 of this chapter are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more or if they meet the definition of a portable device as specified in §2.1093(b) requiring evaluation under the provisions of that section. All other mobile and unlicensed transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§1.1307(c) and 1.1307(d) of this chapter. Applications for equipment authorization of mobile and unlicensed transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section as part of their application."

The device will only be used with a separation distance between the antenna and the body of the user or nearby persons as shown in the table below and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b).

COMPLIANCE WITH FCC KDB 447498 D01 General RF Exposure Guidance v06

"KDB 447498 D01 General RF Exposure Guidance v06" provides the procedures, requirements, and authorization policies for mobile and portable devices.

Devices operating in standalone mobile device exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously are covered in section 7.1.

Devices containing multiple transmitters capable of simultaneous transmissions are covered in section 7.2.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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EXRPT.2019.10.07

LIMITS

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
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 - 100000			1	30

f = frequency in MHz
*** = Plane-wave equivalent power density**

ASSESSMENT

The exposure level for the radio is evaluated at a 20 cm distance from the radio's transmitting antenna using the general equation:

$$S = \frac{P * G}{4 * \pi * R^2}$$

Where: S = power density (mW/cm^2)
P = power input to the antenna (mW)
G = numeric power gain relative to an isotropic radiator
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)
P*G = EIRP

Solving for S, the maximum power density 20 cm from the transmitting antenna is determined. This level is then compared to the applicable limit for the transmit frequency. If limits were not met at the 20 cm boundary the evaluation distance is increased until the limit is met as shown in the table below.

For co-located radios, the ratio of the calculated level to the limit is determined. The ratios for each co-located radio are summed. If the sum is less than or equal to one, then the device is excluded from testing and is deemed compliant.

The devices and radios subject to this report are as follows:

Intermec IP30C containing FCC ID: EHA-IM11 and FCC ID: QOQWT12 co-located with Intermec CN80L0N mobile computer FCC ID: HD5-CN80L0N

The IP30C is an RFID scan handle that clips to the backside of the CN80L0N mobile computer as an optional accessory. Communication between the computer and the scan handle is via Bluetooth. There is no electrical connection between the two devices.

The IM11 UHF RFID radio module is contained within the IP30C hand scanner and is co-located with the CN80L0N mobile computer radios when the mobile computer is mounted in the IP30C scan handle. The duty cycle of the 900 MHz radio is limited to 50% in the software.

The IP30C RFID reader cannot operate while worn next to the body. The user is instructed to operate the reader from the hand, aimed toward remove tags, and pull the trigger to engage the transmitter while maintaining at least a 20 cm separation from the RFID antenna and the head or torso.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

A SAR test exclusion assessment for portable use of the same radios is documented in Element report # INMC1108.4.

MPE estimates for Individual Devices (Conducted Measurements):

Radio	Transmit Frequency (MHz)	Measured Conducted Output Power (mW)	Duty Cycle	Highest Antenna Gain (dBi)	Minimum Antenna Cable Loss (dB)	Minimum Separation Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Ratio
900 MHz RFID in IP30C: 902-928	902.75	938.2	0.5	5.2	0	20	0.3090	0.6	0.5135
Bluetooth in IP30C: 2402-2480	2480	2.2	1	0.5	0	20	0.00050	1.0	0.0005
Bluetooth in CN80L0N: 2402-2480	2402	11.1	1	-0.38	0	20	0.0020	1.0	0.0020
BLE in N80L0N: 2402-2480	2480	1.9	1	-0.38	0	20	0.0004	1.0	0.0004
Zigbee in CN80L0N: 2405-2480	2405	1.96	1	-0.38	0	20	0.00036	1.0	0.00036
802.11 in CN80L0N: 2412-2462	2462	403.7	1	3.36	0	20	0.174	1.0	0.1741
802.11 in CN80L0N: 5180-5240	5230	52.6	1	3.46	0	20	0.023	1.0	0.0232
802.11 in CN80L0N: 5260-5320	5270	52.9	1	3.46	0	20	0.023	1.0	0.0233
802.11 in CN80L0N: 5500-5720	5670	85.1	1	3.46	0	20	0.038	1.0	0.0375
802.11 in CN80L0N: 5745-5825	5825	84.7	1	3.46	0	20	0.037	1.0	0.0374

The information in the table above was obtained from client supplied information for this application and the references provided in the table below:

Radio	Reference
Bluetooth in IP30C	SGS report No. EF/2005/C0012
900 MHz RFID in IP30C	NWEMC report ITRM0323
802.11 in CN80L0N	Bureau Veritas reports No. RF171130C28 and RF171130C28-1
802.11n 2.4 GHz HT40 in CN80L0N	MRT Technology Co., LTD report No. 2001TW0107-U1
Bluetooth in CN80L0N	Bureau Veritas report No. RF171130C28-3
Bluetooth Low Energy in CN80L0N	Bureau Veritas report No. RF171130C28-4
Zigbee in CN80L0N	Bureau Veritas report No. RF171130C28-5

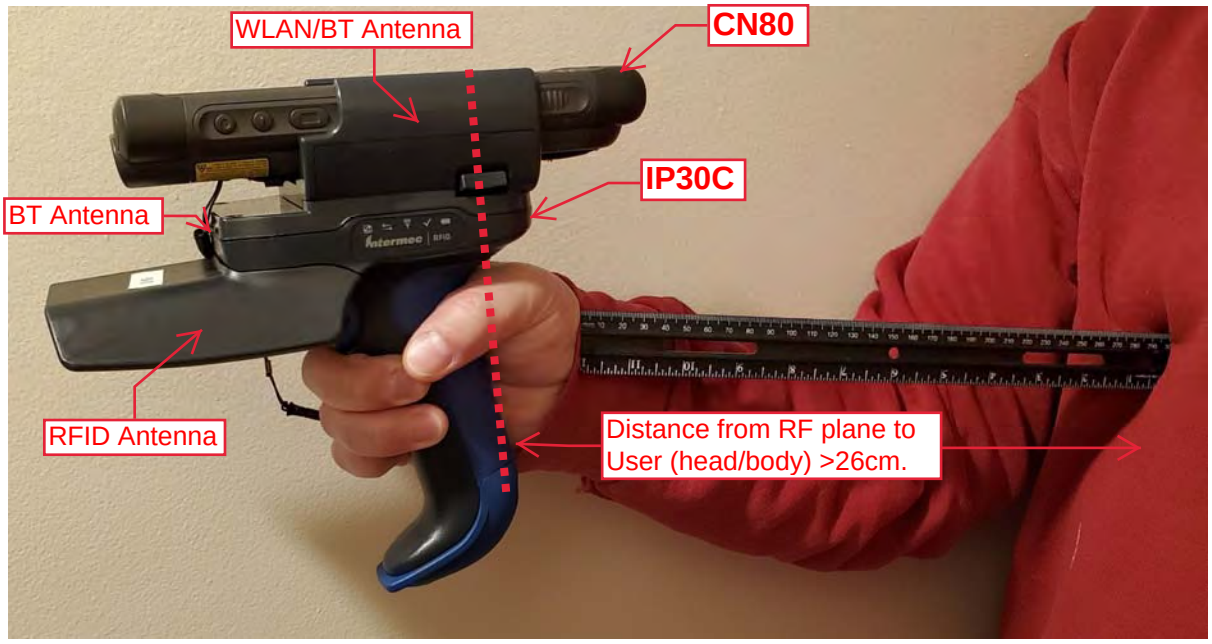
Worst Case Co-located Exposure Conditions:

The firmware for the Bluetooth, Bluetooth Low Energy, 802.11 radios in the CN80L0N mobile computer prevents simultaneous transmission of these radios (from FCC ID: HD5-CN80L0N filing documentation).

Radio	Transmit Frequency (MHz)	Power Density (mW/cm^2)	Ratio	FCC limit for Co-location
Bluetooth in IP30C	2480	0.0005	0.0005	
900 MHz RFID in IP30C	902.75	0.309	0.5135	
802.11 in CN80L0N	2437	0.174	0.1741	
		Sum of Ratios:	0.6881	1

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

IP30C/CN80 to Body Separation Distance



Separation distance > 26.0 cm

IP30C RF Exposure Condition: CN80 mobile computer attached


Intermec
RFID