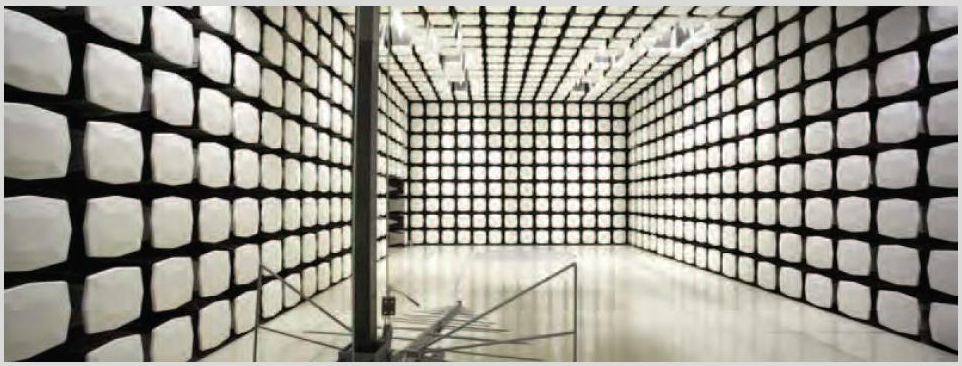
TURCK Inc.

PD67 Handheld RFID Reader

SAR Evaluation Report: TURC0061.19, Issue Date: July 22, 2020

Evaluated to the following SAR specification:

FCC 2.1093:2020



NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

Last Date of Test: July 1, 2020
TURCK Inc.
EUT: PD67 Handheld RFID Reader

Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013	Pass

Highest Simultaneous SAR Values

Variant	Frequency Bands (GHz)	Extremity (W/kg)	Limit (W/kg)	Exposure Environment
		10 g	10 g	
UHF RFID	0.902 – 0.928	0.72	4	General Population
802.11 radio	2.4 – 2.4835			

Deviations From Test Standards

None

Approved By:

Don Facteau, Systems Architect

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

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

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

Australia/New Zealand

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

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

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

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

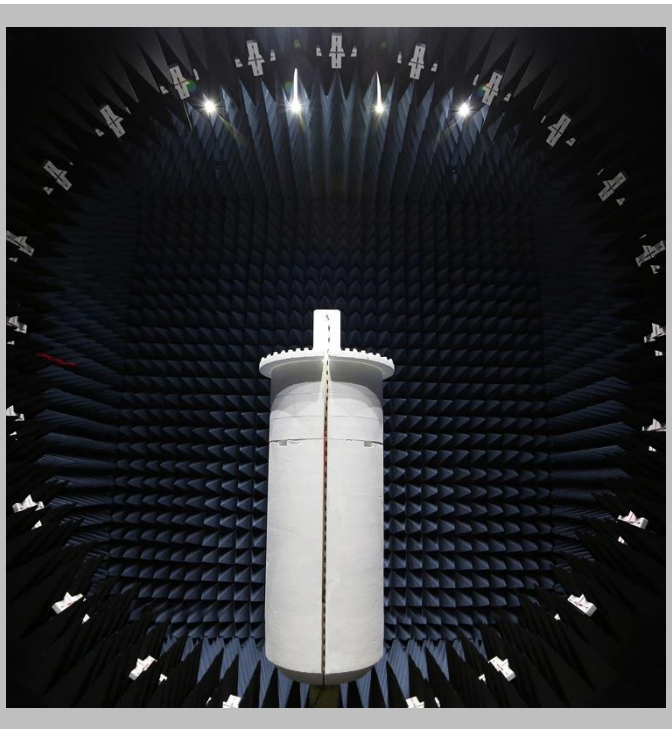
MIC – Recognized by MIC as a CAB for the acceptance of test data.

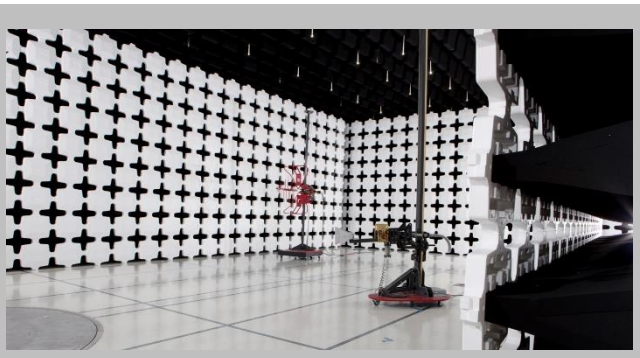
SCOPE

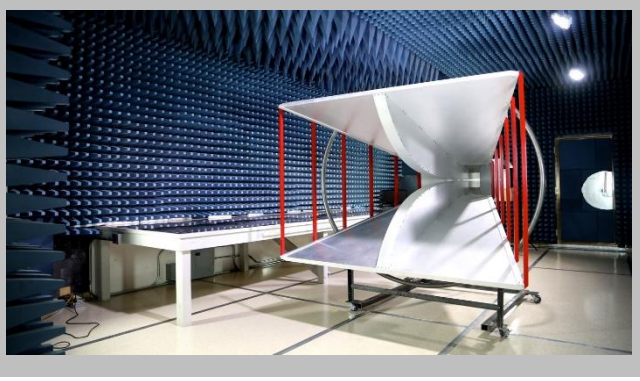
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
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:	TURCK Inc.
Address:	3000 Campus Dr
City, State, Zip:	PLYMOUTH, MN 55441
Evaluation Requested By:	Gabe Selinger
EUT:	PD67 Handheld RFID Reader

Information Provided by the Party Requesting the Evaluation

Functional Description of the Equipment:

PD67 is a battery operated, handheld device for reading HF and UHF RFID tags. There are two model variants, one has a barcode scanner and one does not. It is capable of WiFi communication, and has a USB C interface for battery charging and communication. When transmitting for RFID reading, it has a max output power of about 30dBm. Its duty cycle while transmitting is NOT constant (it is calculated and adjusted every time based on factors such as tag response and reflected power). The user interfaces with the device via 3 buttons, as well as a capacitive touch LCD. The device runs Android as its operating system. The barcode scanner contains a linear LED for aiming purposes, but there is NOT a laser. The battery is Lithium Ion. The device also has GPS capability, via an internal on-board antenna.

The device contains the following radios:

HF RFID
UHF RFID
Wi-Fi 802.11bgn
Bluetooth BDR/EDR
Bluetooth Low Energy
GPS (Receive Only)

The device transmits Wi-Fi 802.11bgn and Bluetooth from the same combination radio module (FCC ID: TFB-TIWI1-01)

Transmit Frequency Ranges:

a) HF RFID: 13.56 MHz
b) UHF RFID: 902-928 MHz
c) 802.11bgn: 2412-2462 MHz (SISO, 20 MHz channel bandwidth)
d) Bluetooth BDR/EDR: 2402-2480 MHz
e) Bluetooth Low Energy: 2402-2480 MHz

Objective:

To demonstrate compliance with FCC RF exposure requirements for 2.1093 portable devices for simultaneous transmission.

SAR test reports associated with this report:

The SAR Evaluation reports from which the data was taken to support the calculations in this report are:

Element report TURC0061.14 contains the SAR data for the 802.11/BT radio module.
Element report TURC0064 contains the SAR data for the UHF RFID radio.

RF Exposure Condition

The following RF Exposure conditions were used for the assessment documented in this report:	
Intended Use	Portable
Location on Body (if applicable)	Extremity (See Photos at the end of the report)
How is the Device Used	PD67 is a battery operated, handheld device for reading HF and UHF RFID tags.
Radios Contained in the Same Host Device	HF RFID (13.56 MHz) UHF RFID (915 MHz) 802.11bgn Bluetooth BDR/EDR Bluetooth Low Energy (HF RFID operating at 13.56 MHz and certified under FCC 15.225 is categorically exempt from RF Exposure Evaluation due to being inherently low power)
Simultaneous Transmitting Radios	UHF RFID and Bluetooth BDR/EDR UHF RFID and Bluetooth Low Energy UHF RFID and 802.11bgn NOTE: The Wi-Fi / Bluetooth radio module can transmit Bluetooth BDR/EDR, Bluetooth Low Energy, or 802.11bgn at any time but cannot transmit any of these three modes simultaneous with each other.
Body Worn Accessories	None
Environment	General Population/Uncontrolled Exposure

SAR SIMULTANEOUS TRANSMISSION

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OVERVIEW

Human exposure to RF emissions from portable devices (47 CFR §2.1093) used with the radiating antenna closer than 20 cm to the user requires Specific Absorption Rate (SAR) to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation.

COMPLIANCE WITH FCC 2.1093

"Portable devices that operate in the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Service (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS) and the Medical Device Radiocommunication Service (MedRadio), pursuant to subparts H and I of part 95 of this chapter, respectively, unlicensed personal communication service, unlicensed NII devices and millimeter wave devices authorized under §§15.253(f), 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use. All other portable 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 portable transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section. Technical information showing the basis for this statement must be submitted to the Commission upon request."

The EUT will be used with a separation distance of greater than 20 centimeters between the radiating antenna and the body of the user or nearby persons but within 20 centimeters of the user's hand and forearm (Extremities) and must therefore be considered a portable transmitter per 47 CFR 2.1093(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.

Standalone radio SAR test exclusion is covered under section 4.3.1. Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Thresholds are met as shown in the Limits section below.

Simultaneous transmission SAR test exclusion is covered under section 4.3.2. SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

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LIMITS

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310 (c)

The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the SAR test exclusion thresholds are 1-g for head and body SAR and 10-g SAR for extremity SAR.

EQUIPMENT OPERATIONAL DETAILS

The devices and radios subject to this report are detailed in the included Product Description.

METHOD OF EVALUATION – SIMULTANEOUS TRANSMISSION CONFIGURATION

KDB 447498 D01 General RF Exposure Guidance v06, Section 4.3.2(b)

"When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

1) *[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [$\sqrt{f(GHz)}/x$], for test separation distances ≤ 50mm;*

   where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.

2) *0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is > 50 mm.*

This SAR estimation formula has been considered in conjunction with the SAR Test Exclusion Thresholds to result in substantially conservative SAR values of ≤ 0.4 W/kg. When SAR is estimated, the peak SAR location is assumed to be at the feed-point or geometric center of the antenna, whichever provides a smaller antenna separation distance, and this location must be clearly identified in test reports. The estimated SAR is used only to determine simultaneous transmission SAR test exclusion; it should not be reported as the standalone SAR. When SAR is estimated, it must be applied to determine the sum of 1-g SAR test exclusion. When SAR to peak location separation ratio test exclusion is applied, the highest reported SAR for simultaneous transmission can be an estimated standalone SAR if the estimated SAR is the highest among the simultaneously transmitting antennas (see also KDB Publication 690783 D01). For situations where the estimated SAR is overly conservative for certain conditions, the test lab may choose to perform standalone SAR measurements, then use the measured SAR to determine simultaneous transmission SAR test exclusion. Estimated SAR values at selected frequencies, distances, and power levels are illustrated in Appendix D.

SAR SIMULTANEOUS TRANSMISSION

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The highest report SAR from each of the radios in the worst case simultaneous transmit condition is summed the table below, the sum is shown to be less than 4 W/kg, the limit for extremity exposure conditions.

Radio	Highest Reported 10-g SAR (W/kg)	Summed 10-g SAR (W/kg)	Specification (W/kg)
900 MHz RFID	0.31	0.72	4
802.11	0.41		

The information in the tables above was obtained from:

Element report TURC0061.14 contains the SAR data for the 802.11/BT radio module.
Element report TURC0064 contains the SAR data for the UHF RFID radio.