



RF - TEST REPORT

- Human Exposure -

Type / Model Name : PR 400-22 (01)

Product Description : Rotating laser

Applicant : Hilti Corporation

Address : Feldkircherstrasse 100

9494 SCHAAN, LIECHTENSTEIN

Manufacturer : Hilti Corporation

Address : Feldkircherstrasse 100

9494 SCHAAN, LIECHTENSTEIN

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : **80183252-05 Rev_1**

03. December 2024

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

Contents

1	<u>TEST STANDARDS</u>	<u>3</u>
2	<u>EQUIPMENT UNDER TEST</u>	<u>4</u>
2.1	Information provided by the Client	4
2.2	Sampling	4
2.3	Photo documentation of the EUT – See ATTACHMENT A	4
2.4	Equipment type, category	4
2.5	Short description of the equipment under test (EUT)	4
2.6	Variants of the EUT	4
2.7	Operation frequency and channel plan	4
2.8	Transmit operating modes	4
2.9	Antennas	5
2.10	Power supply system utilised	5
3	<u>TEST RESULT SUMMARY</u>	<u>6</u>
3.1	Revision history of test report	6
3.2	Final assessment	6
4	<u>TEST ENVIRONMENT</u>	<u>7</u>
4.1	Address of the test laboratory	7
4.2	Environmental conditions	7
4.3	Statement of the measurement uncertainty	7
5	<u>HUMAN EXPOSURE</u>	<u>8</u>
5.1	Maximum permissible exposure (MPE)	8

ATTACHMENT A as separate supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310 Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091 Radiofrequency radiation exposure evaluation: **mobile devices**.

Part 1, Subpart 2, Section 2.1093 Radiofrequency radiation exposure evaluation: **portable devices**.

KDB 447498 D01 v06 RF Exposure procedures and equipment authorisation policies for mobile and portable devices, October 23, 2015.

ANSI C95.1: 2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

ETSI TR 100 028 V1.3.1: 2001-03, Electromagnetic Compatibility and Radio Spectrum Matters (ERM);
Uncertainties in the Measurement of Mobile Radio Equipment
Characteristics—Part 1 and Part 2

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.3 Photo documentation of the EUT – See ATTACHMENT A

2.4 Equipment type, category

BLE device, mobile equipment

2.5 Short description of the equipment under test (EUT)

The rotating laser tool has a visible red rotating laser beam and a reference beam set at 90° to the main beam. The rotating laser can be used vertically, horizontally and for slopes. The tool is designed to be used to determine, transfer and check levels, verticals, slopes and right angles. The tool can be used remotely controlled by a laser receiver.

Number of tested samples: ---
Serial number: ---
Firmware version: ---

2.6 Variants of the EUT

According to the applicant the following model variants exist

PR 40-22 (01)	red laser, one axis levelling
PR 40G-22 (01)	green laser, one axis levelling
PR 400-22 (01)	red laser, two axes levelling

2.7 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

2.8 Transmit operating modes

The EUT uses GFSK modulation and may provide following data rates:

- 125 kbps

(kbps = *kilobits per second*)

2.9 Antennas

The following antenna shall be used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (GHz)	Gain (dBi)
1	Omni	PCB inverted F antenna	PCB	2.4 – 2.5	1.1

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 21.6 V DC

3 TEST RESULT SUMMARY

FCC Rule Part	RSS Rule Part	Description	Result
KDB 447498, 7.1	RSS-102, 6.6	MPE / FRL exposure exemption	passed
KDB 447498, 4.3.1	RSS-102, 6.3	SAR exclusion consideration	not applicable
KDB 447498, 7.2	RSS-102, 8.2.3	Co-location, Co-transmission	not applicable

The mentioned RSS Rule Parts in the above table are related to:
RSS 102, Issue 6, December 2023

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80183252-05	0	16 May 2024	Initial test report
	1	03 December 2024	General: Update RSS-102 from issue 5 to issue 6 Clause 1: reference KDB 447498 corrected

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfills the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : ---

Testing concluded on : ---

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Franz-Xaver Schrettenbrunner
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

5.1.1 Description of the test location

Test location: NONE

5.1.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.1.3 Description of Determination

The maximum rated peak output power (radiated) is used for EIRP. MPE is calculated with the Friis transmission formula, in a defined distance away from the product ($r=20\text{cm}$).

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm^2)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20 \text{ cm}$)

The output power of the device is taken from the power measurement in the test report 80183252-04 Rev0 of the accredited test laboratory CSA Group Bayern GmbH, Ohmstraße 1-4, 94342 Straßkirchen, Germany.

Max. EIRP: 12.5 dBm 17.78 mW

$$S = 17.78 \text{ mW} / (4 * \pi * [20 \text{ cm}]^2)$$

$$\mathbf{S = 0.0035 \text{ mW}/\text{cm}^2}$$

5.1.4 Determination of MPE according to FCC

Calculated power density of the EUT is $S = 0.0035 \text{ mW/cm}^2$ in the frequency range $f > 1500 \text{ MHz}$.

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
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	---	---	1.0	30

f = Frequency in MHz

5.1.5 Determination of MPE according to ISED

Max. EIRP of the EUT: EIRP = 17.78 mW
 Calculated of the limit for $f = 2400 \text{ MHz}$ $P_{\text{Limit}} = 2.67 \text{ W}$

Exemption limits for routine Evaluation – RF exposure evaluation according to RSS-102, 6.6:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (adjusted for tune-up tolerance), where f is in MHz;

At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

The requirements are **FULFILLED**.

Remarks: None.
