



Radio Frequency Exposure Evaluation Report

For:

Garmin International, Inc.

Model Name:

A04281

Product Description:

Mobile mounted digital recording device

FCC ID: IPH-04281

ISED ID: 1792A-04281

Applied Rules and Standards:

CFR Part 1.1307 & 1.1310, Part 2.1091

ISED RSS-102 Issue 5

Report number: EMC_GARMI-107-22001_FCC_MPE

DATE: 12-05-2022



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1. Assessment

This RF Exposure evaluation report provides information about compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091), and ISERC standard RSS-102, under given conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant). In addition, maximum antenna gain or minimum distance towards the human body is calculated, respectively, where relevant.

The device meets the limits as stipulated by the above given FCC/ISERC rule parts based on available specifications.

Company Name	Product Description	Model #
Garmin International, Inc.	Mobile mounted digital recording device	A04281

Responsible for Testing Laboratory:

12-05-2022	Compliance	Arndt Stoecker (Director of Regulatory Services)	
Date	Section	Name	Signature

Responsible for the Report:

12-05-2022	Compliance	Kris Lazarov (Senior EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3.
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2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
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Director of Regulatory Services:	Arndt Stoecker
Responsible Project Leader:	Sangeetha Sivaraman

2.2. Identification of the Client

Applicant's Name:	Garmin International, Inc.
Street Address:	1200 East 151st Street
City/Zip Code	Olathe, KS / 66062
Country	USA

2.3. Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3. Equipment under Assessment

Model No	A04281
HW Version	0
SW Version	0.42
FCC-ID :	IPH-04281
IC-ID:	1792A-04281
FWIN:	A04281
HVIN:	A04281
PMN:	A04281
Product Description:	Mobile mounted digital recording device
Transceiver Technology	LTE Band 2, 4, 5, 12, 66 Bluetooth LE WLAN 802.11a/b/g/n/ac 2.4 GHz; UNII-1; UNII-3
Co-located Transmitters/ Antennas?	Cellular and WLAN can transmit simultaneously
Power Supply/ Rated Operating Voltage Range	5Vdc, 2A
Operating Temperature Range	-20°C to + 70°C
Sample Revision	<input type="checkbox"/> Prototype <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production
Device Category	<input type="checkbox"/> Fixed Installation <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable
Exposure Category	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

Radio Technology	Maximum Power (dBm)	Peak Gain (dBi)
LTE Bands 2, 4, 5, 12, 66	25 - See Note 1	0.38 – See Note 5
Bluetooth LE 2.4 GHz	2.71 – See Note 2	5.30 - See Note 5
WLAN 2.4 GHz	17.45 – See Note 3	5.30 - See Note 5
WLAN 5 GHz	18 – See Note 4	1.98 - See Note 5

Note 1: The power and tune up tolerance were obtained from the EC25 Module grant

Note 2: The power was obtained from Cetecom report # EMC_GARMI-107-22001_15.247_BTLE_DTS_Rev1

Note 3: The power was obtained from Cetecom report # EMC_GARMI-107-22001_15.247_WIFI_DTS_Rev1

Note 4: The power was obtained from Cetecom report # EMC_GARMI-107-22001_15.407_UNII_Rev1

Note 5: Antenna gain was provided by the customer in the file Antenna Gain Information: A04281

4. RF Exposure Limits and FCC and ISED

4.1. FCC § 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

Single RF sources as defined in paragraph (b)(2) of FCC § 2.1091 is exempt if the ERP (watts) is no more than the calculated value prescribed for that frequency. General frequency and separation-distance dependent MPE-based effective radiated power ERP thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)].

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

4.2. RSS-102, cl. 2.5.2 Exemption Limits for Routine Evaluation:

300MHz <= Operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz)^{0.6834} W

4.3. RF Exposure Test Exemptions for Simultaneous Transmission Sources

Multiple RF sources are exempt if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th} , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i .

ERP_j = the ERP of fixed, mobile, or portable RF source j .

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j , at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k , as applicable from § 1.1310 of this chapter.

5. Evaluations

5.1. Routine Environmental Evaluation Applicability Standalone Transmission

Band of Operation	ERP (W)	EIRP (W)	Maximum Duty Cycle	FCC Threshold ERP (W)	ISED Threshold EIRP (W)
LTE 2	0.21	0.345	1:1	0.77	2.24
LTE 4	0.21	0.345	1:1	0.77	2.12
LTE 5	0.21	0.345	1:1	0.42	1.29
LTE 12	0.21	0.345	1:1	0.36	1.15
LTE 66	0.21	0.345	1:1	0.77	2.12
Bluetooth LE 2.4 GHz	0.004	0.006	1:1	0.77	2.71
WLAN 2.4 GHz	0.115	0.188	1:1	0.77	2.71
WLAN 5 GHz	0.061	0.100	1:1	0.77	4.51

Note 1: All calculations are with the manufacturer declared minimum of 20cm distance between the antenna and the human body.

Conclusion:

- The equipment fulfills the MPE exclusion limits for the minimum 20cm distance between the antenna and the human body in a standalone transmission evaluation for both FCC, and ISED

5.2. Routine Environmental Evaluation Applicability Simultaneous Transmission

- Theoretically the worst case of simultaneous transmission is with the WLAN operating at the highest output power mode, and the Cellular operating in the band with the lowest FCC ERP threshold limit (WLAN 2.4 GHz + LTE B12).

Calculation based on the formula in section 4.3 for worst case of simultaneous transmission using the ERP thresholds defined in section 5.1:

$$\text{WLAN 2.4 GHz} + \text{LTE B12} = 0.115 / 0.77 + 0.21 / 0.36 = 0.74 < 1$$

Conclusion:

- The equipment is excluded from simultaneous transmission MPE test.

6. Revision History

Date	Report Name	Changes to report	Report prepared by
12-05-2022	EMC_GARMI-107-22001_FCC_MPE	Initial Version	Kris Lazarov

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