



RF Exposure Evaluation Report

FOR:

Garmin International, Inc.

Model Name:

GMN-02245

Product Description:

LTE/Wi-Fi Datalink and Data Storage System

FCC ID: IPH-03788

IC: 1792A-03788

Per:

CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),
FCC KDB 447498 D04 Interim General RF Exposure Guidance v01
ISED RSS-102 Issue 5

Report number: EMC_GARMI_116_23001_FCC_ISED_RF_Exposure

DATE: 2023-09-11



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3462B

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the equipment (as identified in section 3 of this test report) with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1.1307, Part 2 (2.1091) and ISED standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power including tune-up tolerance, antenna gain, the distance towards the 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 stipulated by the above given FCC and ISED rule parts based on available specifications for worst-case conditions at a separation distance greater than 20cm to the body.

Company	Description	Model No.
Garmin International, Inc.	LTE/Wi-Fi Datalink and Data Storage System	GMN-02245

Responsible for Testing Laboratory:

		Arndt Stoecker	
2023-09-11	Compliance	(Director of Regulatory Services)	
Date	Section	Name	Signature

Responsible for the Report:

		Art Thammanavarat	
2023-09-11	Compliance	(Senior EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3. CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

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EMC Lab Manager:	Arndt Stoecker
Responsible Project Leader:	Cathy Palacios

2.2 Identification of the Client

Client Firm/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

3.1 EUT Specifications

Model No:	GMN-02245
HW Version :	Ver B
SW Version :	2.30
FCC-ID:	IPH-03788
IC:	1792A-03788
HVIN:	GMN-02245
PMN:	GDL 60
Product Description:	LTE/Wi-Fi Datalink and Data Storage System
Frequency Range / number of channels:	<ul style="list-style-type: none"> ❖ <u>WiFi # 1:</u> <ul style="list-style-type: none"> • Manufacture: Texas Instruments • Module name/number: WiLink WL1807MOD • FCC ID: Z64-WL18DBMOD • IC: 4511-WL18DBMOD ❖ <u>WiFi # 2:</u> <ul style="list-style-type: none"> • Module Name: Texas Instruments • Module Number: WiLink WL1837MOD • FCC ID: Z64-WL18DBMOD • IC: 4511-WL18DBMOD <p>Nominal band: 2400 MHz – 2483.5 MHz; Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels</p> <ul style="list-style-type: none"> ❖ <u>LTE</u> <ul style="list-style-type: none"> • Manufacture: Quectel • Module name/number: EG25-G • FCC ID: XMR201903EG25G • IC: 10224A-201903EG25G ❖ <u>Bluetooth, BLE</u> <ul style="list-style-type: none"> • Manufacture: Texas Instruments <p>Module name/number: WiLink WL1837MOD</p>
Type(s) of Modulation:	BPSK, QPSK, 16-QAM, 64QAM
Modes of Operation:	802.11b/g/n, 20MHz
Power Supply/ Rated Operating Voltage Range:	Vmin: 9 VDC/ Vnom: 24 VDC / Vmax: 32 VDC
Operating Temperature Range:	-40°C to 70 °C
Sample Revision:	<input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production

4 RF Exposure Limits and FCC and ISED Basic Rules

4.1 FCC

4.1.1 § 2.1091(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP_{20cm} in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

$$P_{th}(\text{mW}) = ERP_{20\text{ cm}}(\text{mW}) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f \leq 6\text{ GHz} \end{cases}$$

4.1.2 § 2.1091(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

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

4.2 ISED RSS 102

4.1.4 Clause 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

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 $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

5 Evaluations

5.1 FCC RF Exposure (Standalone)

Radio	Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Power _[W]	Ant-G _[dBi]	ERP _[W]	ERP _[mW]	Threshold ERP _[W]	ERP < Threshold ERP _[W]	FCC 2.1093(c)(1) Pth _[mW] = ERP _{20cm}
Cellular	UMTS Band IV	1.7150	23.28	0.213	1.67	0.191	190.55	0.77	Yes	3060.00
	LTE 4	1.7150	24.07	0.255	1.67	0.229	228.56	0.77	Yes	3060.00
	LTE 7	2.5050	23.28	0.213	5.47	0.457	457.09	0.77	Yes	3060.00
	LTE 41	2.5010	23.35	0.216	5.47	0.465	464.52	0.77	Yes	3060.00
Radio	Tech-Band	Freq-Low _[GHz]	Pwr _[dBm]	Power _[W]	Ant-G _[dBi]	ERP _[W]	ERP _[mW]	Threshold ERP _[W]	ERP < Threshold ERP _[W]	FCC 2.1091(c)(1) Pth _[mW] = ERP _{20cm}
WLAN	802.11g	2.4120	20.46	0.1112	3.05	0.137	136.77	0.77	Yes	3060.00

5.2 ISED RF Exposure (Standalone)

RF Exposure									
RSS-102 2.5.2 D>20 cm (300 ≤ Freq < 6000 MHz)									
Radio	Tech-Band	Freq-Low [MHZ]	Pwr _[dBm]	Power _[W]	Ant-G [dBi]	EIRP _[W]	EIRP _[mW]	Exemption limit for Routine Evaluation	Exemption (Y/N)
Cellular	UMTS Band IV	1715.00	23.28	0.21	1.67	0.31	312.61	2.13	Yes
	LTE 4	1715.00	24.07	0.26	1.67	0.37	374.97	2.13	Yes
	LTE 7	2505.00	23.28	0.21	5.47	0.75	749.89	2.75	Yes
	LTE 41	2501.00	23.35	0.22	5.47	0.76	762.08	2.75	Yes
Radio	Modulation	Freq-Low [MHZ]	Pwr _[dBm]	Power _[W]	Ant-G [dBi]	EIRP _[W]	EIRP _[mW]	Exemption limit for Routine Evaluation	Exemption (Y/N)
WLAN	802.11g	2412.00	20.46	0.11	3.05	0.22	224.39	2.68	Yes

5.3 Multiple RF sources

The worst case of simultaneous transmission is
 LTE Band 7 + WLAN 802.11g (2.45 GHz):
 $(213/3060) + (111/3060) = 0.194 \leq 1$

The sum of the fractional contributions to the applicable thresholds is less than or equal to 1, hence the multiple RF sources are exempt

6 Revision History

Date	Report Name	Changes to report	Prepared by
9/11/2023	EMC_GARMI_116_23001_FCC_RF_Exposure	Initial Version	Art Thammanavarat

<<< The End >>>
