Timco Test Report # TR_2374-21_FCC_MPE_5
Revision: 5
Final Test Date: 08/30/2021
Issue Date: 09/20/2021

ACCREDITED
CERT #0955.01

TIMCO ENGINEERING, Inc.

An IIA Company

Test Report – FCC PART 1.1310 / MPE
Applicant: Garmin International Inc.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager
Date of Signature (YYYY-MM-DD): 09/16/2021

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1. Customer Information

Applicant: Garmin International Inc.
Address: 1200 East 151st Street
Olathe, Kansas 66062, United States

2. Location of Testing

2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

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2.2 Testing was performed, reviewed by

Dates of Testing: 6/25/2021 – 6/25/2021

Signature: Terri Allen

Name & Title: Terri Allen, Technical Assistant
Date of Signature
(YYYY-MM-DD): 2021/09/16

Signature: Sr. EMC Engineer EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer
Date of Signature
(YYYY-MM-DD): 2021/09/16

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3. Test Sample(s) (EUT/DUT)

The test sample was received: 04/21/2021

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	IPH-04163
Brief Description	Radar
Type of Modular	n/a
Model(s) #	n/a
Firmware version	n/a
Software version	n/a
Serial Number	n/a

Technical Characteristics	
Technology	Licensed Non-Broadcast Station Transmitter
Frequency Range	9300-9500 MHz
RF O/P Power (Max.)	49.43 W
Modulation	Pulse w/ no modulated information
Bandwidth & Emission Class	83M0PON
Duty Cycle	n/a
Antenna Connector	Proprietary
Voltage Rating (AC or Batt.)	DC 12 V

Antenna Characteristics						
Antenna Name	Frequency Range	Antenna Type	Dimensions	Peak Antenna Gain	Beam Width	Average Antenna Gain
Compact Antenna	9.0 – 9.5 GHz	Linear Array	18″	21.3 dBi	5.2	2.9 dBi
Compact Antenna	9.0 – 9.5 GHz	Linear Array	24″	22.7 dBi	3.7	2.8 dBi

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4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

The following guidance FCC KDB 447498 D01 General RF Exposure Guidance v06 was used for RF exposure evaluation as per FCC Part 1.1310 and FCC Part 2.1091 and part 2.1093. Full test results are available in this report.

4.1.1 FCC 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)
A Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*($900/f^2$)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

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4.2 Equations

POWER DENSITY

E(V/m) = SQRT (30 * P * G) / d

Pd(W/m^2) = E^2 / 377

S = EIRP / (4 * Pi * D^2)

Where:

S = Power density, in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power, in mW
D = Separation distance in cm

Power density is converted from units of mW/cm^2 to units of W/m^2 by multiplying by 10.

DISTANCE

D = SQRT (EIRP / (4 * Pi * S))

Where:

D = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power, in mW
S = Power density in mW/cm^2

SOURCE-BASED DUTY CYCLE (When applicable (for example, multi-slot mobile phone applications) A duty cycle factor may be applied.)

Source-based time-average EIRP = (DC / 100) * EIRP

Where:

DC = Duty Cycle in % as applicable.
EIRP = Equivalent Isotropic radiated Power, in mW

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5. RF Exposure Results

MPE

Frequency Band	Evaluation Distance (cm)	Max Power + Tolerance (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	EIRP (W)	Power Density	Limit for Uncontrolled Exposure	Limit for Controlled Exposure	Distance Required to meet Uncontrolled Exposure Limt (cm)
9225-9500 MHz	20	40.25	2.90	11%	10.60	2.109 mW/cm2	1 mW/cm2	5 mW/cm2	29.05

RESULT: Passes Limit at Distance: 29.05 cm

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6. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_2374-21_FCC_MPE_	1	Initial release	8/30, 2021
	2	Updated Page 5 & 8	9/03/2021
	3	Updated Page 8	9/16/2021
	4	Updated Page 8	9/20/2021
	5	Updated Description on Page 5	9/20/2021

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END OF TEST REPORT

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