Test Report 2024-145

Version B
Issued 7 Aug 2024

Project GCL-0462
Model Identifier: A04883
Primary Test Standard
47CFR 1.1310
47CFR 2.1093
RSS-102 Issue 6
IEC 62479 Ed 1
EN 62479: 2010

Garmin Compliance Lab
Garmin International
1200 E 151st Street
Olathe Kansas 66062 USA

Client-supplied Information

FCC ID:	IPH-04883
IC ID:	1792A-04883

ACCREDITED
CERTIFICATE #6162.01

See section 6 of this report regarding the presence or absence of accreditation logos or marks on this cover page.

1. Summary

The equipment or product described in section 5 of this report was tested at the Garmin Compliance Lab according to standards listed in section 6. This report focuses on the 2.4 GHz transceiver(s). The results are as follows.

Parameter	Description	Key Performance Values [Performance Class]	Result	Data starts at page
Transmit Power	The average transmit power presented to the antenna is used to determine the undesired biological effects the test sample could evoke.	This data has no Pass or Fail values under this standard but is used in subsequent analyses.	Measured	14
Exemption from routine evaluation	Radio emissions at the separation distance are sufficiently low to exempt the radio from a detailed evaluation.	The tuned time averaged EIRP power was below the exemption limit in each case analyzed.	Exempt	17
Exposure Reference Level (MPE)	Radio emissions at the separation distance are below the exposure reference level where health effects could be a concern.	N/A	N/A	N/A

NT (Not Tested) means the requirement may or may not be applicable, but the relevant measurement or test was not performed as part of this test project.

N/A (Not Applicable) means the lab judged that the test sample is exempt from the requirement.

Table 1: Summary of results

Report Organization

For convenience of the reader, this report is organized as follows:

1. Summary
2. Test Background
3. Report History and Approval
4. Test Sample Modifications and Special Conditions
5. Description of Equipment Tested
6. Test Standards Applied
7. Measurement Instrumentation Uncertainty
8. Selected Examples of Calculations
9. Environmental Conditions During Test
10. Immunity Performance Criteria

Annex: Test records are provided for each type of test, following the order and page numbering stated in the summary table. Concluding notes appear on the final page of this report.

2. Test Background

2.1 The Test Lab

The testing reported here was performed at the Garmin Compliance Lab, an organization within Garmin International, located at 1200 E 151st St, Olathe Kansas, USA. The contact telephone number is +1.913.397.8200.

2.2 The Client

The testing was performed on behalf of the Garmin design group, a separate organization located at 1200 E 151st St, Olathe Kansas, USA. Witnesses from the business group included: None.

2.3 Other Information

Test Sample received: 17 Jun 2024
Test Start Date: 18 Jun 2024
Test End Date: 10 Jul 2024

The data in this test report apply only to the specific samples tested.

Upon receipt all test samples were believed to be properly assembled and ready for testing.

3. Report History and Approval

This report was written by Majid Farah and initially issued on 30 July 2024 as Version A.
Version B on 7 Aug 2024 implements RSS-102 Issue 6 with an updated exemption evaluation, an updated list of standards in section 6, and minor editorial changes.

Report Technical Review:

David Arnett
Technical Lead EMC Engineer

Report Approval:

Shruti Kohli
Manager Test and Measurement (EMC, Reliability and Calibration)

4. Test Sample Modifications and Special Conditions

The following special conditions or usage attributes were judged during test to be necessary to achieve compliance with one or more of the standards listed in section 6 of this report:
None.

The following modifications to the test sample(s) were made, and are judged necessary to achieve compliance with one or more of the standards listed in section 6 of this report:

Modification 1
Detailed Description: A change of firmware from Version 2.10 to 2.11
Date applied: 20 Jun 2024
Reason for this modification:
This modification was performed on all samples due to a connectivity issue between EUT and companion device during BLE Receiver blocking testing. The client stated this firmware change only affects the BLE test page. Based on the client's statement GCL judged the presence of this modification has no effect on any other tests.

5. Description of the Equipment Tested

5.1 Unique Identification

Product Model	A04883
Serial Numbers Tested	3477207518

This product tested is a mobile device for collecting and sharing data with the user and nearby electronic devices.

The client affirmed that the test samples will be representative of production in all relevant aspects.

5.2 Key Parameters

EUT Input Power:	5 Vdc
I/O Ports:	USB
Radio Transceivers:	Bluetooth Low Energy (BLE), ANT, NFC
Radio Receivers:	GPS L1, GPS L5, Galileo E1, Galileo E5a/b, BeiDou, GLONASS
Primary Functions:	Data collection and communication
Typical use:	Portable in multiple orientations
Highest internal frequency:	2.484 GHz
Firmware Revision	2.11 (see also section 4 of this report)

5.3 Operating modes

During the test, the EUT was operated in one or more of the following modes.

Mode 3: M3 (BleTx). Bluetooth Low Energy radio transmitting consistently on a selected channel at 1 Mbps or 2 Mbps

Mode 4: M4 (BleLnk). Bluetooth Low Energy radio is paired to a companion device, transmitting and receiving data on various channels in accordance with the protocol, and maintaining the paired relationship.

Mode 5: M5 (AntTx). ANT radio transmitting consistently on a selected channel.

Mode 6: M6 (AntLnk). ANT radio is paired to a companion device, transmitting and receiving data in accordance with the protocol, and maintaining the paired relationship.

Mode 9: M9 (RxBtBlA). The radio was set to receive 2.4 GHz signals but not transmitted in Bluetooth, Bluetooth low energy or ANT.

Mode 11: M11 (NfcTag). The NFC radio was transmitting and actively linked to a passive NFC tag.

Mode 12: M12 (NfcLnk). The NFC radio was transmitting and actively linked to an NFC card reader.

Mode 13: M13 (GnssY). The Global Navigation Satellite System receiver is monitoring the GNSS bands, attempting to detect a constellation and determine location. Unless otherwise noted, the EUT was provided simulated GNSS signals representing one of more constellation types. In addition, the EUT may have been reporting signal levels and satellite data to an attached computer to monitor link health.

Mode 14: M14 (NfcIdle). The NFC Radio was powered, but not transmitting or linked to any devices.

Mode 15: M15 (Normal). EUT is in normal operational mode (User mode) if some Transmitters are on during normal operational mode exclude radiations on those frequency.

Mode 17: M13 (GnssN). The Global Navigation Satellite System receiver is monitoring the GNSS bands, attempting to detect a constellation and determine location. The EUT is in GNSS receiving mode but no GNSS signal provided.

Mode 19: M19 (ML1). Multiple link, combining modes M4 & M6. The EUT is actively paired to both a BLE and an ANT companion device, used for Immunity tests.

Mode 20: M20 (ML2). Multiple link, combining modes M12 & M13. The EUT is actively linked to a NFC card reader and the specified satellite system, used for immunity tests.

5.4 EUT Arrangement

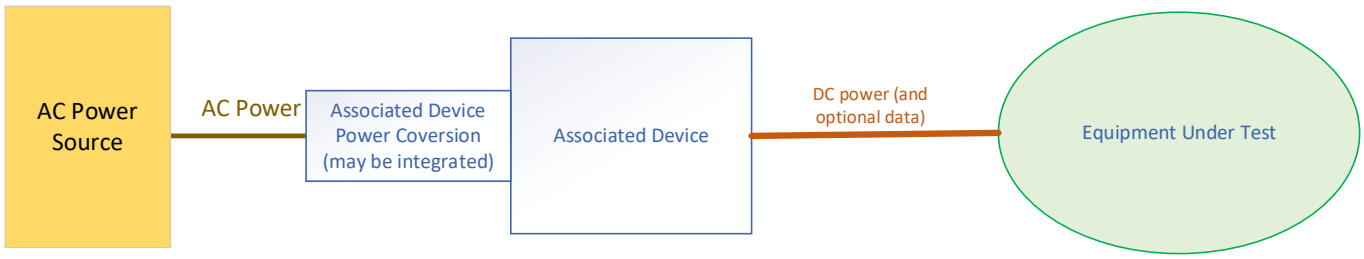
During test, the EUT components and associated support equipment were selected including the following arrangement sets.

Arrangement 1: A1 (Solo). The test sample operates from its battery and no external physical connections. No block diagram is needed for this arrangement.

Arrangement 2: A2 (Upwr). The test sample is attached to a Mains-powered device connected that provides dc power to the sample over a cable but no user data. See the block diagram in Figure 1.

Arrangement 3: A3 (Udata). The test sample is attached to a Mains-powered device connected that provides dc power to the sample and user data over a cable. See the block diagram in Figure 1.

Arrangement 4: A4 (Udc). The test sample is attached to a Mains-powered device connected that provides dc power to the sample and may or may not provide user data. This arrangement is specified in the test plan to provide staff flexibility when the presence or absence of data on the cable is not pertinent. See the block diagram in Figure 1.



This interconnect drawing is not to scale.
It does not indicate the placement of devices.

Figure 1: Block diagram of equipment for arrangements A2, A3, A4

Arrangement 5: A5 (NFCp) The test sample is placed near an NFC Card Reader or NFC tag. The NFC Card Reader is connected to a laptop computer. The test sample is powered by a device that does not include data over the cable, just as with A2. For clarity, test sample is NOT powered by, or connected to, the laptop computer that powers the NFC Card Reader.

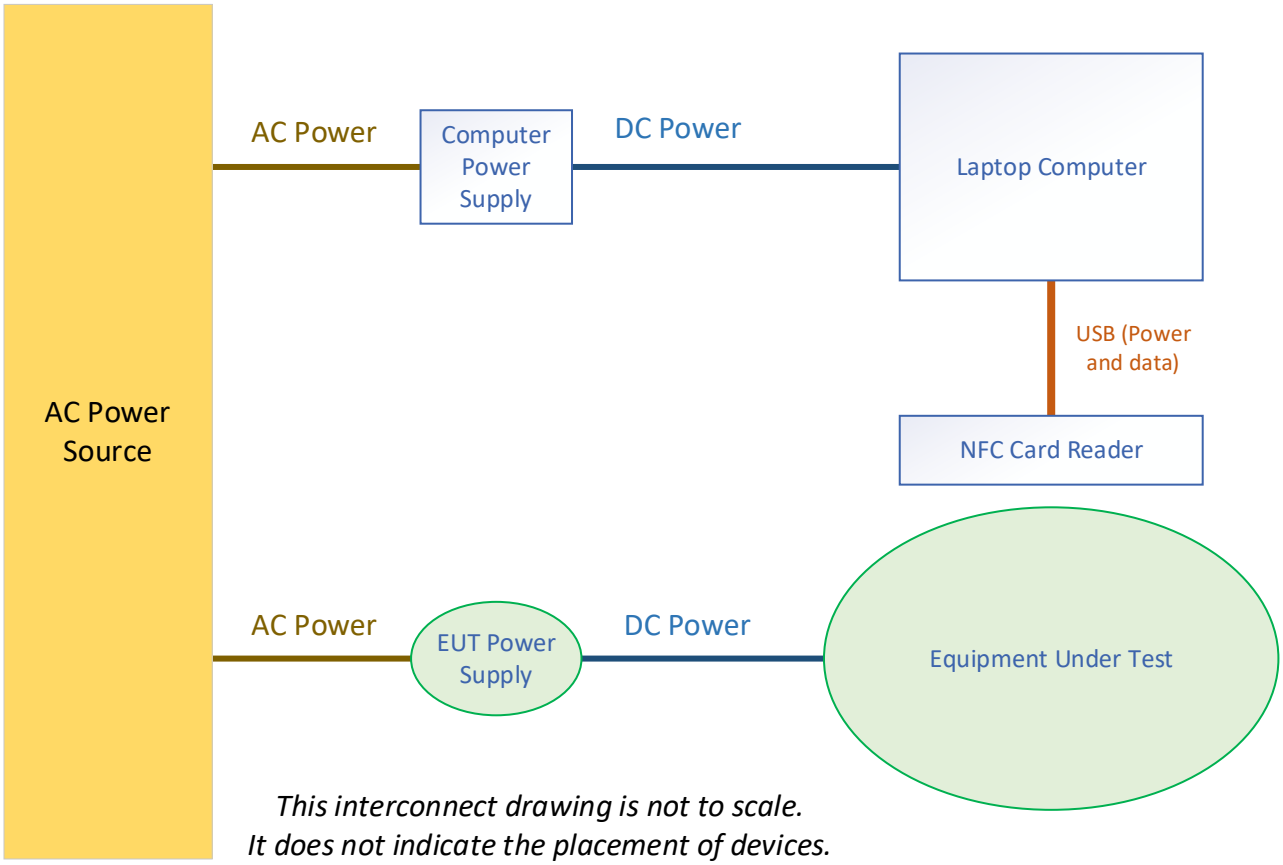


Figure 2: Block diagram of equipment arrangement A5

Arrangement 6: A6 (NFCu) The test sample is placed near an NFC Card Reader or NFC tag. The NFC Card Reader is connected to a laptop computer. The test sample is powered by its own batteries rather than an external power source. Either NFC Card reader or NFC tag can be used during test.

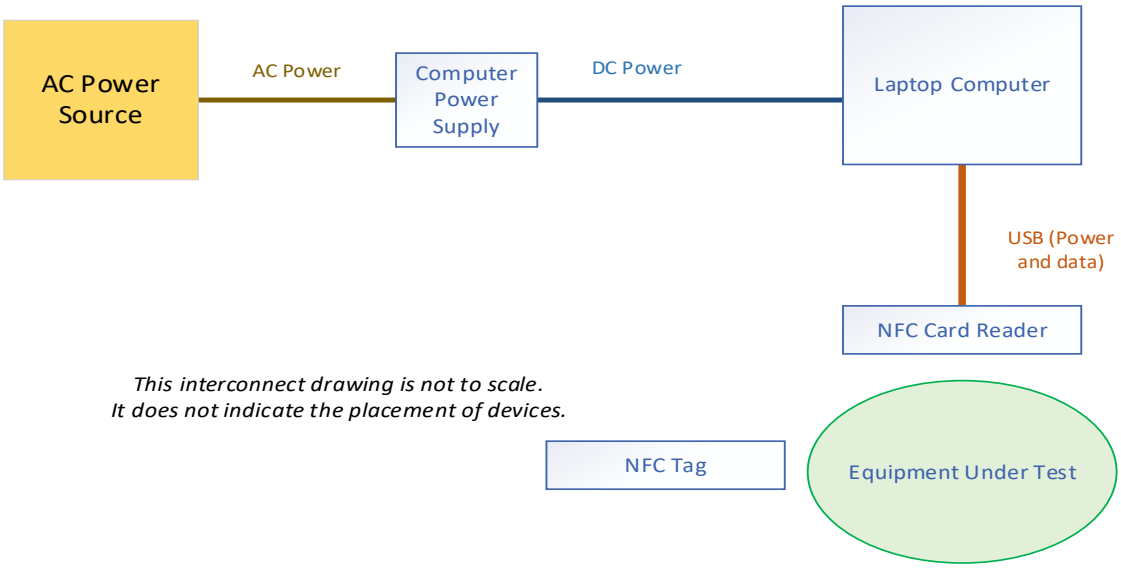


Figure 3: Block diagram of equipment arrangement A6

5.5 Associated Equipment (AE) used

Description	Manufacturer	Model	Serial Number
USB C power adaptor	Phihong (Garmin)	AQ27A-59CFA	362-00118-00
Laptop	Dell	Precision 5540	3JYG33
Power Supply	Dell	HA130PM130	CN-0V363H-CH200-78G-0DC1-A01
Laptop	Dell	Latitude 5410	5VSPFB3
Power Supply	Dell	HA65NM191	CN-0H374X-CH200-0BD-7TC0-A020BD-7TC0-A02
Phone	Samsung	SM-G973U (S10)	RF8MC0W9XVR
NFC Card Reader	ACS	ACR1252U-M1	RR554-118449
NFC Tag	SANPOPO	NTAG215	PD-STICKER-B-30
Auxiliary device	Garmin	A04883	3477207518

Table 2: List of associated equipment that may have been used during test

5.6 Cables used

Description	From	To	Length	EMC Treatment
USB C to custom cable	Power and/or Data source	EUT	0.5m	None

Table 3: List of cables that may have been used during test

6 Test Standards Applied

6.1. Accredited Standards

The following test or measurement standards were applied and are within the scope of the lab's accreditation. All results in this report that cite these standards are presented as Accredited results consistent with ISO/IEC 17025.

IEC 62479 Ed 1: 2010
EN 62479: 2010

6.2. Non-accredited Standards

The following test or measurement standards were applied and are either outside the scope of the lab's accreditation, or were performed in such a way that results are not presented as being fully accredited.

RSS-102 Issue 6
47CFR 1.1310
47CFR 2.1093

6.3 Variances

The following variances were applied to standards cited in this section.

Where different test standards cover the same test parameter or phenomenon, and the standards have compatible differences, the stricter of the requirements is typically applied. For example, a consolidated limit may be applied to emission tests selecting the strictest of the limits at each frequency. Likewise, if one standard requires a vertical antenna sweep with boresighting and another does not, swept motion with boresighting will typically be used as it is the more stringent requirement.

6.4 Laboratory Accreditation

The Garmin Compliance Lab, an organization within Garmin International, is registered with the US Federal Communication Commission as US1311. The lab is recognized by the Canada Department of Innovation, Science, and Economic Development (ISED) under CAB identifier US0233.

The Garmin Compliance Lab, an organization within Garmin International, is accredited by A2LA, Certificate No. 6162.01. The presence of the A2LA logo on the cover of this report indicates this is an accredited ISO/IEC 17025 test report. If the logo is absent, this report is not issued as an accredited report. Other marks and symbols adjacent to the A2LA logo are accreditation co-operations of which A2LA is a member under a mutual recognition agreement, and to which the Garmin Compliance Lab has been sublicensed.

7 Measurement Instrumentation Uncertainty

The lab has analyzed the sources of measurement instrumentation uncertainty. The analysis concludes that the actual measurement values cited in this report are accurate within the U_{LAB} intervals shown below with approximately 95% statistical confidence. Where the report shows a judgment that a test sample passes a test against a published limit based on these measured values, that judgment has a statistical confidence of 97.5% or greater. Measurement Instrumentation Uncertainty is one component of over-all measurement uncertainty, and other uncertainty components are not considered as part of this analysis.

The primary benchmark for measurement instrumentation uncertainty (MIU) in an electromagnetic compatibility (EMC) test lab is the set of U_{CISPR} values published in CISPR 16-4-2. In all cases where a U_{CISPR} value is published by CISPR, the analysis shows that U_{LAB} – this lab's estimated MIU – is better than the U_{CISPR} benchmark.

The secondary benchmark for MIU in an EMC lab performing radio transceiver tests is a set of uncertainty limit values published in various ETSI standards. In this report, U_{ETSI} is the most restrictive of the values found in the ETSI EN standards listed in section 5 of this report. The analysis principles are described in the ETSI TR documents listed there. In most cases U_{LAB} is better than the U_{ETSI} benchmark. Where U_{LAB} exceeds the U_{ETSI} benchmark cited here, that entry is preceded by an asterisk. When required by the ETSI EN standards, excess uncertainty will be added to the measurand before comparison to a limit. In an individual test report, staff may re-evaluate that excess uncertainty based on the uncertainty of the method used and the uncertainty limits of the actual ETSI EN standard being applied, and the revised uncertainty values will be shown in the test report.

Some measurement uncertainties analyzed and reported here are not addressed in CISPR 16-4-2 or the ETSI standards, as indicated by the entry 'None.'

Test Type		**U_{LAB}**	**U_{CISPR}**	**U_{ETSI}**
Conducted DC voltage		0.09% + 2 x LSDPV	None	1%
Conducted AC voltage below 500 Hz		1.0% + 3 x LSDPV	None	2%
Conducted Emissions, Mains Voltage		0.10% + 10 mV	None	None
Conducted Emissions, Mains Current		0.10% + 3 mA	None	None
Conducted Emissions, Mains Power		0.15% + 100 mW	None	None
Conducted Emissions, Power Mains, 9 kHz to 150 kHz		1.49 dB	3.8 dB	None
Conducted Emissions, Power Mains, 150 kHz to 30 MHz		1.40 dB	3.4 dB	None
Conducted Emissions, Cat 6 LCL, 150 kHz to 30 MHz		2.80dB	5 dB	None
Conducted Emissions, Cat 5 LCL, 150 kHz to 30 MHz		3.21 dB	5 dB	None
Conducted Emissions, Cat 3 LCL, 150 kHz to 30 MHz		4.24 dB	5 dB	None
Radiated Emissions, below 30 MHz		0.88 dB	None	6 dB
Radiated Emissions, 30 MHz to 1000 MHz		2.77 dB	6.3 dB	6 dB
Radiated Emissions, 1 GHz to 18 GHz		2.60 dB	5.2 & 5.5 dB	6 dB
Radiated Emissions, 18 GHz to 26.5 GHz		2.73 dB	None	6 dB
*Radio Signal Frequency Accuracy		*1.55 x 10^-7	None	1.0 x 10^-7
Radio Signal Occupied Bandwidth		0.95%	None	5%
Radio Power or Power Spectral Density		0.98 dB	None	1 dB
Temperature		0.38 °C	None	1 °C
Barometric Pressure		0.38 kPA	None	None
Relative Humidity		2.85% RH	None	±5% RH
Signal Timing	The greater of these three...	0.63 usec 0.01% of value 0.5 x LSDPV	None	None

Note: *LSDPV stands for the Least Significant Digit Place Value reported. In the value 1470 msec, the least significant digit is the 7. It has a 10 msec place value. The LSDPV is thus 10 msec and the maximum error due to roundoff would be 5 msec. If the time value were reported as 147<u>0</u> msec, the underscore indicates that the 0 is a significant figure and the error due to roundoff would be 0.5 msec. All digits provided to the right of a decimal point radix are significant.*

8 Selected Example Calculations

Certain regulators require samples of the calculations that lead from the raw measurement to the final result for AC Mains conducted and unintended radiated emissions. The assumption is that the lab performs raw measurements, then adds, subtracts, multiplies, or divides based on transducer factors, amplifier gains, and losses in the signal transmission path. In this lab, our CISPR 16 Receiver does not work that way. The calibration factors and losses and gains are provided to the receiver as detailed data files. These factors are applied in the RF measurement path prior to the detector. But as a step in the lab measurement process, staff frequently verify that these factors are applied correctly. They make a measurement with the factors applied inside the receiver, then they disable the factors and remeasure the result manually adding in the various relevant factors.

The transmission loss is measured including the combined losses and gains of preamplifiers, cables, and any band-selective filters. In many cases above 1 GHz it is a negative value, indicating that the preamplifier gain is greater than these other losses.

Here are examples of these calculations. The data in these examples was not taken as part of this project:

8.1 AC Mains conducted emissions at 22 MHz

(Raw measurement) + (AMN factor) + (transmission loss) = Result

(7.145 dBuV) + (9.812 dB) + (0.216 dB) = 17.173 dBuV

8.2 Radiated Emissions at 630 MHz

(Raw measurement) + (Antenna factor) + (transmission loss) = Result

(2.25 dBuV) + (27.80 dB/m) + (2.89 dB) = 32.94 dBuV/m

8.3 Radiated Emissions at 2.7 GHz

(Raw measurement) + (Antenna factor) + (transmission loss) = Result

(43.72 dBuV) + (32.22 dB/m) + (-36.09 dB) = 39.85 dBuV/m

9 Environmental Conditions During Test

Environmental conditions in the test lab were monitored during the test period. Temperature and humidity are controlled by an air handling system. As information to the reader, the conditions were observed at the values or within the ranges noted below. For any tests where environmental conditions are critical to test results and require further constraints or details, the test records in the annex may provide more specific information.

Temperature:	19.8 to 21.3 °C
Relative Humidity:	42.5% to 60% (non-condensing)
Barometric Pressure	96.8 to 98.9 kPa

Description	Make	Model #	Serial #	Last Cal/Ver	Next Due
Barometer	Traceable	6453	221702700	3-Aug-2022	1-Aug-2024

Table 4: Environmental monitoring device

10 Immunity Performance Criteria

If this report includes immunity tests then results have been categorized as Performance Criteria A, B, C, or D. The standards that the lab applied will define the details for A, B, and C, as well as which criterion is required for each type of test. They will also define the electrical stresses that were applied during each test. In a very general sense the observed criteria noted in this report are as follows:

Criterion A. The stress applied did not alter product operation. This criterion is generally used for 'continuous' stresses that can be present for a long time in the places the product will be used, or that can appear often, even though they may come and go over time.

Criterion B. The stress applied altered product operation, but the product self-recovered so that the user would not have to try to figure out how to restore it to full operation. This criterion is generally used for 'transient' stresses that appear briefly and occasionally, but are usually not present in the places the product will be used.

Criterion C. The stress applied altered product operation, but the user could restore it to full operation, for example by power cycling the product. This criterion is generally used for 'transient' stresses that appear briefly and only rarely in the places the product will be used.

Criterion D. This is not an official criterion in the standards, because it would be a failure of the requirements. This indication in a test record means the product was affected in a way that the user might not be able to correct. The effect could include some degree of hardware damage, or it could include loss of program files or data files necessary for operation.

Repeatability is an issue in all EMC immunity work. When the product operation changes unexpectedly during a test, and the change would fail the requirements of the standard, this is an anomaly. The test operator needs to determine whether the anomaly was a result of the applied electrical stress. The investigation is done by repeating the section of the test where the anomaly occurred three times. If the same or a similar anomaly occurs in any of the three repeat trials, it is confirmed as a response to the stress. If not, the anomaly is judged unreproducible and is not considered when judging the A, B, or C observed performance. Since there is usually no ability to confirm a Criterion D anomaly, these are usually treated as Criterion D upon a single occurrence.

Tests that require Criterion B performance will be judged to Pass if criteria A or B is observed. Similarly, tests that require Criterion C performance will be judged to Pass if criteria A, B, or C is observed.

ANNEX

The remainder of this report is an Annex containing individual test data records. These records are the basis for the judgments summarized in section 1 of this report. The Annex ends with a set of concluding notes regarding use of the report.

Test Record
Transmitter Power, Duty Cycle
Test IDs TR02, TR03
Project GCL0462

Test Date(s)	18 Jun 2024
Test Personnel	Majid Farah
Product Model	A04883
Serial Number tested	3477207518
Operating Mode	M3 (BleTx), M5 (AntTx)
Arrangement	A4 (Udc)
Input Power	5 Vdc
Test Standards:	FCC Part 15, ANSI C63.10, ETSI EN 300 328, RSS-GEN, RSS-247, FCC Part 1.1310, FCC Part 2.1093, RSS-GEN, RSS-102, IEC/EN 62311, and IEC/EN 62479 (as noted in Section 6 of the report)
Antenna Gain	Maximum -2.3 dBi, as reported by the client
Radio Protocol	BLE (Bluetooth Low Energy), ANT
Pass/Fail Judgment:	**PASS**
Test record created by:	**Majid Farah**
Date of this record:	**19 Jul 2024**

Original record, Version A.

Test Equipment Used

Description	Make	Model #	Serial #	Last Cal/Ver	Next Due
RF Power Sensor	Rohde&Schwarz	NRP8S	109927	7-Jul-2023	1-Jul-2024

Table TR02.1: List of test equipment used

Software used: Rohde & Schwarz Power Viewer V11.3; TimePowerAnalysisSpreadsheetv11.xls, RFExposurev2.xls

Test Method
The basic test standards provide options for the time evaluation test method. The following test methods were applied.

ETSI EN 300 328: 5.4.2.2.1.3
ANSI C63.10: 11.9.1.3

Under the ETSI standard, the parameters of duty cycle, transmitter timing, or medium utilization are typically not required for adaptive transceivers or transceivers emitting at 10 dBm EIRP or less, so those results will be omitted from the data set. Duty Cycle data will be included if it is relevant to test methods used for other standards such as Average Detector methods in the ANSI standards that apply duty cycle correction or certain kinds of analysis under the RF exposure standards.

Transmit Power and Timing Data
Each measurement is made conducted from the antenna port with the transmitter on a specified channel and in a selected transmission protocol. Where standards cited here apply harmonized test methods and different limits, the more strict limit has applied.

This test record will show results based on one or more of the following methods of analyzing the same set of raw power data vs. time. The ANSI peak power method looks for the highest power in the data record, with results in dBm units. Under the US and Canadian rules a limit of 30 dBm is applied. The ETSI 300 328 method looks at the

individual transmission bursts within the data record and reports the power level from the burst with the for the highest average power. The ETSI result is presented in dBm EIRP units, and a 20 dBm EIRP limit is applied. The RF exposure analysis asks for the average power observed over time, with results in linear power units such as milliwatts. RF exposure limits are not addressed in this test record. Many of the these standards also care about duty cycle, the portion of the time when the transmitter was actually transmitting. That is presented as a pure number less than 1, and no limit applies. All of these results are drawn from the same power data. The results are shown below.

Frequency	(MHz)	2402	2404	2440	2478	2480
BT Low Energy	1 Mbps	**3.32**	**NT**	**3.25**	**NT**	**3.16**
BT Low Energy	2 Mbps	**NT**	**3.33**	**3.23**	**3.13**	**NT**
ANT	----	**3.24**	**NT**	**3.18**	**NT**	**3.07**

Table TR02.2: Transmit Power, ANSI method, in dBm

Frequency	(MHz)	2402	2404	2440	2478	2480
BT Low Energy	1 Mbps	**0.83**	**NT**	**0.74**	**NT**	**0.65**
BT Low Energy	2 Mbps	**NT**	**0.19**	**0.12**	**0.01**	**NT**
ANT	----	**0.83**	**NT**	**0.77**	**NT**	**0.67**

Table TR02.3: Transmit Power, ETSI method, in dBm EIRP

The ETSI method also requires that transmit power be verified for stability at the extremes of operating temperature. The ANT transmitter was verified for power stability vs temperature on 2402 MHz.

Tx Mode	Temp	Power	Limit	Result
	˚C	dBm EIRP	dBm EIRP	
ANT	60	0.47	20	Pass
ANT	20	1.05	20	Pass
ANT	-20	1.66	20	Pass

Table TR02.4: Transmit Power over temperature, ETSI method, in dBm EIRP

Frequency	(MHz)	2402	2404	2440	2478	2480
BT Low Energy	1 Mbps	**0.87**	**NT**	**0.86**	**NT**	**0.84**
BT Low Energy	2 Mbps	**NT**	**0.47**	**0.46**	**0.45**	**NT**
ANT	----	**1.97**	**NT**	**1.94**	**NT**	**1.90**

Table TR02.5: Transmit Power, RF exposure method, in mW

Frequency	(MHz)	2402	2404	2440	2478	2480
BT Low Energy	1 Mbps	**0.467**	**NT**	**0.467**	**NT**	**0.467**
BT Low Energy	2 Mbps	**NT**	**0.280**	**0.280**	**0.280**	**NT**
ANT	----	**0.963**	**NT**	**0.963**	**NT**	**0.963**

Table TR02.6: Duty cycle

Setup Diagram
The following block diagrams show how the EUT and test equipment is arranged for test.

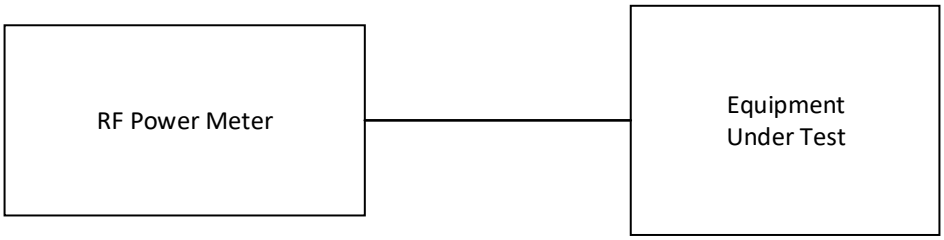


Figure TR02.1: Test equipment setup

This line is the end of the test record.

Test Record
RF Exposure Analysis
Test IDs TR02a, TR03a
Project GCL0462

Product Model	A04883
Serial Number	3477207518
Test Standards:	FCC Part 1.1310, FCC Part 2.1093, RSS-102, IEC/EN 62311, and IEC/EN 62479 (as noted in Section 6 of the report).
Radio Protocol(s)	BLE (Bluetooth Low Energy), ANT
Separation Distance	0.5 cm (as stated by the client)
Antenna Gain	Maximum -2.3 dBi (as stated by the client)
Tune-up Tolerance	10% (as stated by the client)
Judgment:	**EXEMPT from further detailed analysis**
Analysis by:	**Majid Farah**
Date of this record:	**6 Aug 2024**

Version A was issued on 19 Jul 2024 and followed RSS-102 Issue 5 Amd 1. Version B on 6 Aug 2024 implements RSS-102 Issue 6.

Software used: RFExposureToolV3.xslx

Analytical Method

The analytical method used in the Garmin Compliance Lab considers the limits and requirements of the standards listed above. For determination of the exemption, the requirements of Canada's RSS-102 regulations and the FCC requirements are just as strict, or are more strict, than each of the other standards listed. Therefore, if the product is judged Exempt under both the RSS-102 and the FCC Rules, it is judged Exempt for all listed standards.

This test record for RF transmit power uses the exact same raw data set and processes the data according to the methods used for RF exposure evaluation. The RF Exposure analysis yields an average power over time, and an embedded duty cycle value. This test record will simply summarize the RF Exposure average power and duty cycle data from those test records and take those results into the RSS-102 and FCC RF exposure analysis.

Transmit Power and Timing Data

Radio Type	Power (mWatt)	Duty Cycle 100%=1
BLE 1Mbps	0.87	0.467
BLE 2Mbps	0.46	0.280
ANT	1.97	0.963

Table TR02a.1: Tx power and duty cycle summary

Based on these values, the following radio modes and modulations were selected as the worst-case conditions for evaluation and the evaluation per the RSS and FCC standards are provided below:

Parameter	Unit	Value
Radio type	---	**BLE1**
Lowest Tx frequency	MHz	2402
Highest Tx frequency	MHz	2480
Separation distance	cm	0.5
Tx power to antenna	mW	0.87
Duty cycle embedded above	unitless	0.467
Antenna gain (unused if neg)	dBi	-2.3
Usage Rate	unitless	1.000
6-min time averaging factor	unitless	0.467
Tune-up tolerance	%	10.0
Tuned time-averaged EIRP power	**mW**	**1.0**
Controlled Environment?	----	No
RSS-102 Sec 6 Basic exempt Level	mW	3.0
FCC 1.1307(b)(3)(i) Basic exempt Level	mW	2.7
Most strict of the two:	mW	2.7
Body/Limb use	----	Limb worn
Body/Limb multiplier	unitless	2.5
Final exemption level	**mW**	**7.4**
Judgment:		**Exempt**

Table TR02a.2: Analysis of whether the BLE results meet the exemption level

Parameter	Unit	Value
Radio type	---	**ANT**
Lowest Tx frequency	MHz	2402
Highest Tx frequency	MHz	2480
Separation distance	cm	0.5
Tx power to antenna	mW	1.97
Duty cycle embedded above	unitless	0.963
Antenna gain (unused if neg)	dBi	-2.3
Usage Rate	unitless	1.000
6-min time averaging factor	unitless	0.963
Tune-up tolerance	%	10.0
Tuned time-averaged EIRP power	**mW**	**2.2**
Controlled Environment?	----	No
RSS-102 Sec 6 Basic exempt Level	mW	3.0
FCC 1.1307(b)(3)(i) Basic exempt Level	mW	2.7
Most strict of the two:	mW	2.7
Body/Limb use	----	Limb worn
Body/Limb multiplier	unitless	2.5
Final exemption level	**mW**	**7.4**
Judgment:		**Exempt**

Table TR02a.3: Analysis of whether the ANT results meet the exemption level

The sample is judged to be exempt from further evaluation for the risk of RF exposure.

This line is the end of the test record.

Concluding Notes

This report stands as an integrated record of the tests performed and must be copied or distributed in its complete form. The reproduction of selected pages or sections separate from the complete report would require specific approval from the manager of the Garmin Compliance Lab.

This is the final page of the report.