Test Report 2024-092

Version C
Issued 4 June 2024

Project GCL-0296
Model Identifier: A03996
Primary Test Standard(s)
47CFR 1.1310
47CFR 2.1093
RSS-102 Issue 5 Amd. 1

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

Client-supplied Information
FCC ID: IPH-03996
IC ID: 1792A-03996

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	11
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	15
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: 22 May 2023
Test Start Date: 21 Aug 2023
Test End Date: 12 Apr 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.

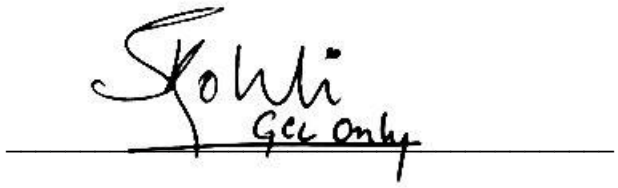
3. Report History and Approval

This report was written by Majid Farah and initially issued on 30 Apr 2024 as Version A. Majid Farah created version B on 24 May 2024 updating the product description. This report was written by Majid Farah and issued on 4 June 2024 as Version C with update on section 2.

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:
The shield of the USB cable must be grounded, with the shield terminated to the connector at both ends.

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: Firmware version changed from V0.78 to V7.78
Detailed Description: This firmware upgrade provides improved compliance test modes and a better test mode control interface for lab staff.
Date applied: 9/18/2023

Reason for this modification: The firmware provides access to required operating modes and radio channels of the EUT for compliance tests, especially those that need EUT to be linked to a companion device.

The following tests were performed without this modification being present, and the presence or absence of the modification is judged by the lab and client to have no significant effect on these specific tests: Transmit Power

Modification 2: Firmware version changed from V7.78 to V7.79
Detailed Description: Transmit power reduction for IEEE 802.11b mode
Date applied: 12/08/23

Reason for this modification: Ensure power spectral density for IEEE 802.11b is below the ETSI EN 300 328 limit.

The following tests were performed without this modification being present, and the presence or absence of the modification is judged by the lab and client to have no significant effect on the compliance results of these specific tests: RF Bandwidth, FCC & ISED Power Spectral Density, Voltage & Temperature stability, Rx spurious emissions, or any tests related to radio services other than IEEE 802.11b.

Modification 3: Firmware version changed from V7.79 to V7.81
Detailed Description: Improve the ability to monitor GNSS signal tracking by EUT during immunity tests.
Date applied: 1/03/2024

Reason for this modification: A visual indicator was added to show the test sample's GNSS signal tracking status when the EUT is floating in water.

Radiated immunity, radiated emission and AC Mains conducted emission tests were performed with this modification being present. The presence or absence of the modification is judged by the lab and client to have no significant effect on any other compliance results.

Modification 4: Hardware change
Detailed Description: Added an LC pi network low pass filter (1 uH and 150 pF) and a LC band stop filter (82 nH and 220 pF) to the USB data lines (D+ and D-). Grounded the shield braid of the cable at both ends of the cable.
Date applied: 03/25/2024

Reason for this modification: To reduce radiated emission while EUT is connected to a computer and exchanging data.

Unintentional radiated emission, AC Mains conducted emission and Electrostatic discharge tests were performed with this modification being present. The presence or absence of the modification is judged by the lab and client to have no significant effect on any other compliance results.

5. Description of the Equipment Tested

5.1 Unique Identification

Product Model	A03996
Serial Numbers Tested	443220748

This product tested is a Transceiver/AP for multiple types of diving purposes.

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 2A, Internal battery 3.7 Vdc
I/O Ports:	USB
Radio Transceivers:	IEEE 802.11 b/g/n, Bluetooth Low Energy, ANT
Radio Receivers:	GPS L1, GLONASS
Acoustic Transceiver:	Subwave
Primary Functions:	Data collection and communication
Typical use:	Portable in multiple orientations or on floor
Highest internal frequency:	2.484 GHz
Firmware Revision	V0.78, V7.78, V7.79, V7.81 (See section 4)

5.3 Operating modes

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

Mode 1: M1 (BleT). Bluetooth Low Energy radio transmitting consistently on a selected channel at 1 Mbps or 2 Mbps

Mode 2: M2 (BleL). 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 3: M3 (AntT). ANT radio transmitting consistently on a selected channel.

Mode 4: M4 (AntL). ANT radio is paired to a companion device, transmitting and receiving data in accordance with the protocol, and maintaining the paired relationship.

Mode 6: M6 (Gnss). 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 7: M7 (All Tx off). This means all radio transmitters turned off.

Mode 8: M8 (WifiT). The IEEE 802.11 b/g/n radio was transmitting consistently on a selected channel, with a specified modulation type, and data rate.

Mode 9: M9 (WifiL). The IEEE 802.11 b/g/n radio is paired to a companion device, transmitting and receiving data on a selected channel in accordance with the protocol, and maintaining the paired relationship.

Mode 12: M12 (All Tx on). This means the radio was tested in modes M1, M3, M8 and M14 if applicable.

Mode 13: M13 (All Rx on). This means the radio was tested in Receiver mode only if applicable.

Mode 14: M14 (Subwave L). The EUT was linked to a companion device thru Subwave.

Mode 15: M15 (Normal). The EUT was working in normal operational mode with charging cable attached or not.

Mode 16: M16 (WifiSub). The EUT was working in normal operational mode and linked or connected to companion devices thru Subwave and IEEE 802.11 b/g/n radio.

Mode 17: M17 (Normal D). EUT is in mass storage mode while charging its batteries and transferring data to a laptop. The IEEE 802.11 b/g/n radio transmitter is OFF and ANT transmitter remains ON.

5.4 EUT Arrangement

During test, the EUT components and associated support equipment were selected including the following arrangement sets. Associated support equipment cand be a laptop or a power adaptor.

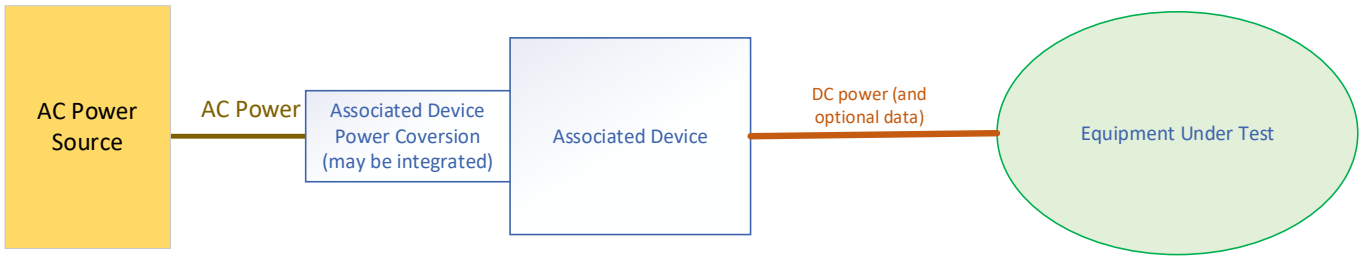
Arrangement 1: A1 (Standalone). The test sample operates from its battery and no external physical connections. No block diagram is needed for this arrangement.

Arrangement 2: A2 (laptop). The test sample is attached to a laptop using a USB cable that provides dc power to the sample over a cable may it used or not used for data transfer.

Arrangement 3: A3 (GNSS). The test sample is attached to a laptop that provides dc power to the sample over a cable. The laptop using a software to collect received data from the test sample.

Arrangement 4: A4 (PwrSupply). The test sample is attached to a variable dc power supply over a cable.

Arrangement 5: A5 (PwrA). The test sample is attached to a dc power adaptor with USB A port over a cable.



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, A5

5.5 Associated Equipment (AE) used

Description	Manufacturer	Model	Serial Number
Laptop Computer	Dell	Latitude 5410	5VSPFB3
Laptop Power Supply	Dell	HA65NM191	None
AC/DC Power adaptor	Phihong technology	PSAF10R-050Q	P183100844A1
ANT companion device	Garmin	T1	28811
Subwave companion device	Garmin	T1	10162
nRF52840 USB dongle	Nordic	400250	PCA10059

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

5.6 Cables used

Description	From	To	Length	EMC Treatment
USB-A Clip	Power and/or Data source	EUT	114 cm	None
USB-C Clip	Power and/or Data source	EUT	114 cm	Both ends of cable shield are connected.

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.

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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.

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:	20.5 to 24.8 °C
Relative Humidity:	19.9% to 55.7% (non-condensing)
Barometric Pressure	96.3 to 99.5 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
Test IDs TR01
Project GCL-0296

Test Date(s)	21-23 Aug, 16 Nov, 05, 08 Dec 2023
Test Personnel	Jim Solum supervised by Majid Farah
Product Model	A03996
Serial Number tested	443220748
Operating Mode	M12 (All Tx on)
Arrangement	A2 (Laptop)
Input Power	5Vdc
Test Standards:	FCC Part 15, ANSI C63.10, ETSI EN 300 328, RSS-210, RSS-247 (as noted in Section 6 of the report).
Antenna Gain	3.22 dBi, BLE and ANT as reported by the client 2.36 dBi, IEEE 802.11b/g/n as reported by the client
Radio Protocol	Bluetooth Low Energy, ANT and IEEE 802.11b/g/n
Pass/Fail Judgment:	**PASS**
Test record created by:	**Jim Solum**
Date of this record:	**12 Jan 2024**

Original record, Version A published 13 2024. Rev B on 12 Jan 2024 more fully explains the relevance of the firmware changes mentioned in section 4 of the report.

Test Equipment Used

Description	Make	Model #	Serial #	Last Cal/Ver	Next Due
PXE Receiver 44GHz	Keysight	N9048B	MY62220139	30-Jan-2023	1-Feb-2024
Thermometer	Thermco	ACCD370P	220608121	26-Aug-2022	1-Sep-2024
DMM Multimeter	FLUKE	79 III	71740743	5-Apr-2023	1-Apr-2024
Programmable DC power source	Keithley	2260B-30-72 720 W	1411917	21-Apr-2023	15-Apr-2024
Thermal Chamber	Tenney	T2RC	31244	Calibration	Not Required
RF Power Sensor	Rohde&Schwarz	NRP8S	109927	7-Jul-2023	1-Jul-2024
RF Power Sensor	Rohde&Schwarz	NRP8S	109124	18-Jul-2023	15-Jul-2025

Table TR01.1: List of test equipment used

Software used: Rohde & Schwarz Power Viewer V11.3, TimePowerAnalysisSpreadsheetv10.xls, PXE Software Revision A.33.03

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

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.

Transmit Power and Timing Data

There are two separate analyses performed on the data set from the broadband fast diode power sensor. Under the ANSI method, the analysis reports the peak value of power observed, in dBm units. Under the ETSI method, each transmission burst is analyzed to find the burst with the highest average power, antenna gain is added, and the resulting unit is dBm EIRP. Both analyses will be reported, even though the report in which this record appears may not need each of these methods.

Each measurement is made conducted from the antenna port with the transmitter on a specified channel and in a selected transmission protocol. The data record length is 100 msec for the Bluetooth-like protocols and 1 second for WiFi. Where standards cited here apply harmonized test methods and different limits, the more strict limit has applied. The results are shown below.

The results are shown below. Yellow highlighted cells indicate the highest power value for each radio protocol. Bluetooth Low Energy at the 2 Mbps data has its lowest and highest channel frequencies set at 2404 MHz and 2478 MHz. The lowest and highest operating channel frequencies for Bluetooth Low Energy at the 1 Mbps and ANT are 2402 MHz and 2480 MHz. Grey 'NT' entries indicate channels or speeds that were not selected for measurement per the design of the experiment.

Frequency	(MHz)	2402	2404	2440	2460	2478	2480
BT Low Energy	1 Mbps	**4.49**	**NT**	**4.29**	**NT**	**NT**	**4.05**
BT Low Energy	2 Mbps	**NT**	**4.48**	**4.30**	**NT**	**4.06**	**NT**
ANT Ch 60	----	**NT**	**NT**	**NT**	**4.00**	**NT**	**NT**

Table TR01.2: BLE and ANT Transmit Power Summary in dBm with ANSI C63.10 analytical methods

Mode	Speed	1	2	3	4	5	6	7	8	9	10	11
B	1	**16.83**	**NT**	**NT**	**NT**	**NT**	**16.88**	**NT**	**NT**	**NT**	**NT**	**17.03**
B	2	**16.78**	**NT**	**NT**	**NT**	**NT**	**16.90**	**NT**	**NT**	**NT**	**NT**	**17.03**
B	5.5	**16.90**	**NT**	**NT**	**NT**	**NT**	**17.06**	**NT**	**NT**	**NT**	**NT**	**17.14**
B	11	**16.78**	**NT**	**NT**	**NT**	**NT**	**16.80**	**NT**	**NT**	**NT**	**NT**	**16.90**
G	6	**13.77**	**NT**	**NT**	**NT**	**NT**	**16.75**	**NT**	**NT**	**NT**	**NT**	**14.03**
G	9	**13.91**	**NT**	**NT**	**NT**	**NT**	**16.87**	**NT**	**NT**	**NT**	**NT**	**14.08**
G	12	**13.76**	**NT**	**NT**	**NT**	**NT**	**16.84**	**NT**	**NT**	**NT**	**NT**	**14.11**
G	18	**13.87**	**NT**	**NT**	**NT**	**NT**	**16.69**	**NT**	**NT**	**NT**	**NT**	**14.15**
G	24	**13.74**	**NT**	**NT**	**NT**	**NT**	**14.82**	**NT**	**NT**	**NT**	**NT**	**13.91**
G	36	**12.54**	**NT**	**NT**	**NT**	**NT**	**13.70**	**NT**	**NT**	**NT**	**NT**	**12.74**
G	48	**12.50**	**NT**	**NT**	**NT**	**NT**	**12.71**	**NT**	**NT**	**NT**	**NT**	**12.71**
G	54	**12.55**	**NT**	**NT**	**NT**	**NT**	**12.66**	**NT**	**NT**	**NT**	**NT**	**12.74**
N	MCS0	**13.70**	**NT**	**NT**	**NT**	**NT**	**16.76**	**NT**	**NT**	**NT**	**NT**	**14.00**
N	MCS1	**13.76**	**NT**	**NT**	**NT**	**NT**	**16.62**	**NT**	**NT**	**NT**	**NT**	**14.04**
N	MCS2	**12.29**	**NT**	**NT**	**NT**	**NT**	**15.35**	**NT**	**NT**	**NT**	**NT**	**12.56**
N	MCS3	**12.39**	**NT**	**NT**	**NT**	**NT**	**13.50**	**NT**	**NT**	**NT**	**NT**	**12.63**
N	MCS4	**12.42**	**NT**	**NT**	**NT**	**NT**	**13.43**	**NT**	**NT**	**NT**	**NT**	**12.50**
N	MCS5	**12.11**	**NT**	**NT**	**NT**	**NT**	**13.27**	**NT**	**NT**	**NT**	**NT**	**12.34**
N	MCS6	**11.80**	**NT**	**NT**	**NT**	**NT**	**11.91**	**NT**	**NT**	**NT**	**NT**	**12.04**
N	MCS7	**11.48**	**NT**	**NT**	**NT**	**NT**	**11.65**	**NT**	**NT**	**NT**	**NT**	**11.70**

Table TR01.3: WiFi Transmit Power Summary in dBm with ANSI C63.10 analytical methods

Mode	Speed	1	2	3	4	5	6	7	8	9	10	11
B	1	**16.87**	**NT**	**NT**	**NT**	**NT**	**16.82**	**NT**	**NT**	**NT**	**NT**	**16.98**
B	2	**16.86**	**NT**	**NT**	**NT**	**NT**	**16.83**	**NT**	**NT**	**NT**	**NT**	**16.97**
B	5.5	**16.87**	**NT**	**NT**	**NT**	**NT**	**16.82**	**NT**	**NT**	**NT**	**NT**	**16.95**
B	11	**16.72**	**NT**	**NT**	**NT**	**NT**	**16.91**	**NT**	**NT**	**NT**	**NT**	**17.03**

Table TR01.4: WiFi Mode B Transmit Power Summary in dBm with ANSI C63.10 analytical methods after firmware change. (See Report section 4)

Frequency	(MHz)	2402	2404	2440	2460	2478	2480
BT Low Energy	1 Mbps	**7.62**	**NT**	**7.44**	**NT**	**NT**	**7.19**
BT Low Energy	2 Mbps	**NT**	**7.59**	**7.41**	**NT**	**7.19**	**NT**
ANT Ch 60	----	**NT**	**NT**	**NT**	**7.22**	**NT**	**NT**

Table TR01.5: BLE and ANT Transmit Power Summary in dBm EIRP with ETSI analytical methods

Mode	Speed	1	2	3	4	5	6	7	8	9	10	11
B	1	**18.96**	**NT**	**NT**	**NT**	**NT**	**19.01**	**NT**	**NT**	**NT**	**NT**	**19.16**
B	2	**18.75**	**NT**	**NT**	**NT**	**NT**	**18.87**	**NT**	**NT**	**NT**	**NT**	**18.98**
B	5.5	**18.43**	**NT**	**NT**	**NT**	**NT**	**18.35**	**NT**	**NT**	**NT**	**NT**	**18.46**
B	11	**18.60**	**NT**	**NT**	**NT**	**NT**	**18.61**	**NT**	**NT**	**NT**	**NT**	**18.72**
G	6	**15.92**	**NT**	**NT**	**NT**	**NT**	**18.89**	**NT**	**NT**	**NT**	**NT**	**16.12**
G	9	**15.77**	**NT**	**NT**	**NT**	**NT**	**18.75**	**NT**	**NT**	**NT**	**NT**	**16.01**
G	12	**15.54**	**NT**	**NT**	**NT**	**NT**	**18.58**	**NT**	**NT**	**NT**	**NT**	**15.71**
G	18	**15.21**	**NT**	**NT**	**NT**	**NT**	**18.23**	**NT**	**NT**	**NT**	**NT**	**15.42**
G	24	**15.02**	**NT**	**NT**	**NT**	**NT**	**16.09**	**NT**	**NT**	**NT**	**NT**	**15.21**
G	36	**14.64**	**NT**	**NT**	**NT**	**NT**	**15.86**	**NT**	**NT**	**NT**	**NT**	**14.91**
G	48	**14.38**	**NT**	**NT**	**NT**	**NT**	**14.41**	**NT**	**NT**	**NT**	**NT**	**14.48**
G	54	**14.22**	**NT**	**NT**	**NT**	**NT**	**14.29**	**NT**	**NT**	**NT**	**NT**	**14.38**
N	MCS0	**15.45**	**NT**	**NT**	**NT**	**NT**	**18.45**	**NT**	**NT**	**NT**	**NT**	**15.59**
N	MCS1	**14.92**	**NT**	**NT**	**NT**	**NT**	**17.95**	**NT**	**NT**	**NT**	**NT**	**15.11**
N	MCS2	**14.57**	**NT**	**NT**	**NT**	**NT**	**17.65**	**NT**	**NT**	**NT**	**NT**	**14.82**
N	MCS3	**14.34**	**NT**	**NT**	**NT**	**NT**	**15.35**	**NT**	**NT**	**NT**	**NT**	**14.43**
N	MCS4	**13.75**	**NT**	**NT**	**NT**	**NT**	**14.82**	**NT**	**NT**	**NT**	**NT**	**13.94**
N	MCS5	**13.43**	**NT**	**NT**	**NT**	**NT**	**14.54**	**NT**	**NT**	**NT**	**NT**	**13.66**
N	MCS6	**13.27**	**NT**	**NT**	**NT**	**NT**	**13.40**	**NT**	**NT**	**NT**	**NT**	**13.51**
N	MCS7	**13.14**	**NT**	**NT**	**NT**	**NT**	**13.28**	**NT**	**NT**	**NT**	**NT**	**13.38**

Table TR01.6: WiFi Transmit Power Summary in dBm EIRP with ETSI analytical methods

Mode	Speed	1	2	3	4	5	6	7	8	9	10	11
B	1	**18.97**	**NT**	**NT**	**NT**	**NT**	**18.96**	**NT**	**NT**	**NT**	**NT**	**19.11**
B	2	**18.80**	**NT**	**NT**	**NT**	**NT**	**18.81**	**NT**	**NT**	**NT**	**NT**	**18.94**
B	5.5	**18.39**	**NT**	**NT**	**NT**	**NT**	**18.36**	**NT**	**NT**	**NT**	**NT**	**18.47**
B	11	**18.54**	**NT**	**NT**	**NT**	**NT**	**18.72**	**NT**	**NT**	**NT**	**NT**	**18.86**

Table TR01.7: WiFi Mode B Transmit Power Summary in dBm EIRP with ETSI analytical methods after firmware change. (See Report section 4)

The table below shows Blue Tooth Low Energy 1 Mbps transmit (2402 MHz) power vs temperature at nominal and hot and cold temperature extremes.

Voltage	°C	Power, dBm EIRP	Limit, dBm EIRP	Result
Nominal	20	7.62	20	Pass
Hot	60	7.16	20	Pass
Cold	-20	8.70	20	Pass

Table TR01.8: BLE 1 2402 MHz Transmit Power Summary in dBm EIRP with ETSI analytical methods

The table below shows Mode B1 transmit (Ch 11) power vs temperature at nominal and hot and cold temperature extremes. The firmware change (see section 4) lowered transmit power, so these values were judged worst-case.

Voltage	°C	Power, dBm EIRP	Limit, dBm EIRP	Result
Nominal	20	19.16	20	Pass
Hot	60	18.72	20	Pass
Cold	-20	19.02	20	Pass

Table TR01.9: Mode B1 Ch 11 Transmit Power Summary in dBm EIRP with ETSI analytical methods before firmware change

This table is a summary of the highest power readings and limits for each type of radio.

Radio Type	ANSI Power (dBm)	Ansi Limit (dBm)	ANSI Power (Watt)	ETSI Power (dBm EIRP)	ETSI Limit (dBm EIRP)
BLE	5.6	21	0.0036	8.7	20
ANT	4	21	0.0110	7.22	20
WiFi b	17.14	30	0.0517	19.16	20
WiFi g	16.87	30	0.0486	18.89	20
WiFi n	16.76	30	0.0475	18.45	20

Table TR01.10: Transmit Power and Results Summary

Setup Diagram

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

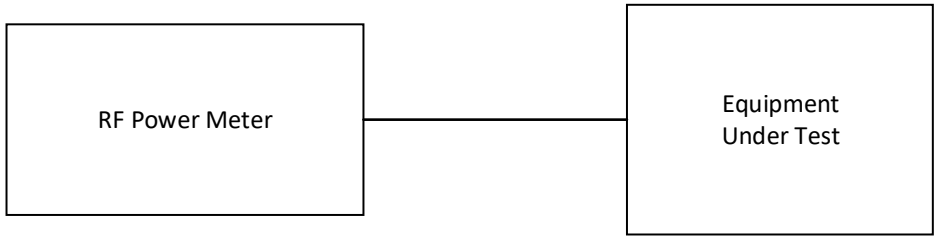

Figure TR01.1: Test equipment setup for power measurements

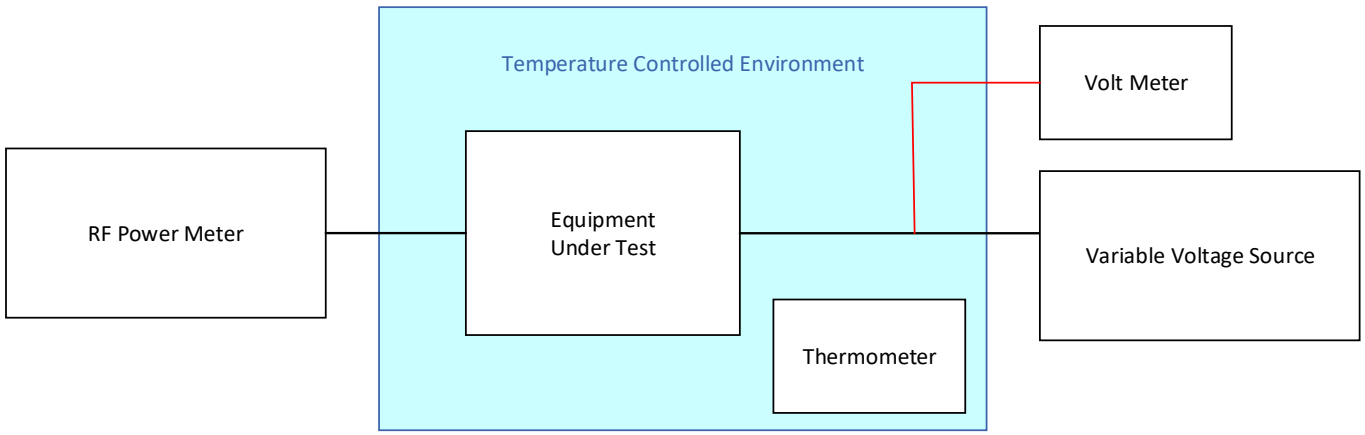

Figure TR01.2: Test equipment setup for transmit power measurements at 60°C and -20°C

This line is the end of the test record.

Test Record
Transmitter Power, Duty Cycle and RF Exposure
Test IDs TR01a
Project GCL0296

Test Date(s)	21-23 Aug, 16 Nov, 05, 08 Dec 2023
Test Personnel	Jim Solum supervised by Majid Farah
Product Model	A03996
Serial Number tested	443220748
Operating Mode	M12 (All Tx on)
Arrangement	A2 (Laptop)
Input Power	5Vdc
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	3.22 dBi, BLE and ANT as reported by the client
Radio Protocol	Bluetooth Low Energy, ANT
Separation distance	20 cm, distance from EUT to user as reported by the client
Pass/Fail Judgment:	**EXEMPT from further detailed analysis**
Test record created by:	**Majid Farah**
Date of this record:	**26 Apr 2024**

Original record, Version A.

Test Equipment Used

Description	Make	Model #	Serial #	Last Cal/Ver	Next Due
PXE Receiver 44GHz	Keysight	N9048B	MY62220139	30-Jan-2023	1-Feb-2024
Thermometer	Thermco	ACCD370P	220608121	26-Aug-2022	1-Sep-2024
DMM Multimeter	FLUKE	79 III	71740743	5-Apr-2023	1-Apr-2024
Programmable DC power source	Keithley	2260B-30-72 720 W	1411917	21-Apr-2023	15-Apr-2024
Thermal Chamber	Tenney	T2RC	31244	Calibration	Not Required
RF Power Sensor	Rohde&Schwarz	NRP8S	109927	7-Jul-2023	1-Jul-2024
RF Power Sensor	Rohde&Schwarz	NRP8S	109124	18-Jul-2023	15-Jul-2025

Table TR01a.1: List of test equipment used

Software used: Rohde & Schwarz Power Viewer V11.3, TimePowerAnalysisSpreadsheetv10.xls, PXE Software Revision A.33.03, RFExposurev1.xls

See test record TR01 for power measurement details. The focus of this test record is on duty cycle and RF exposure data. All measured power data extracted from TR01.

Test Method
The test method used in the Garmin Compliance Lab is to take RF power data in a way that is analyzed according to the rules of multiple compatible standards. The data here was previously reported with the data analysis results using the methods of the following test standards

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

See test record TR01 for power measurement details. The focus on this test record is on duty cycle and RF exposure data. This test record expands on the exact same raw data set of TR01 and provides the data analysis according to the methods used for duty cycle and RF exposure evaluation.

RF Exposure Test Background

RF Exposure testing typically takes one of three routes: exemption from routine evaluation by analysis, calculation of exposure, or determination of specific absorption rate (SAR). SAR applies at transmission frequencies below 6 GHz used closer than 20 cm, unless an exemption can be applied. Clients whose products require SAR measurements are required to seek that detailed RF exposure evaluation elsewhere.

The exemption and exposure calculation paths both rely on a combination of measured values and detail provided by the client. Examples of measured values are:

- RF power delivered to an antenna, which is measured with a fast diode-based RF power meter
- Electric or magnetic field components at a distance, measured on a radio test range at 3 m distance
- RF signal short term duty cycle, which is embedded in the RF power meter or electric/magnetic field data

Note that the RF power meter data set analyzed and reported in this section is the same data set used for the analysis in the RF Power and Timing section of the test record TR01.

Detail provided by the client are:

- Antenna gain in the peak direction, referenced to an ideal isotropic antenna
- The separation distance between the product under test and a user or other person

The standards typically allow power to be averaged in linear power units over a period of 6 minutes. That is divided into two distinct factors: duty cycle and usage rates. The RF power meter reads peak power levels over a measurement duration of up to 1 second. Embedded in that data set is a short term duty cycle that is attributable to the types of signals being transmitted, and the low level radio protocol details. It deals with sub-second timing. The usage rate is a factor based on how often and how long a product could transmit and is often based on user behaviors. Usage rate analyzes what happens over several seconds or minutes of time. These two factors are multiplied to determine the complete 6-minute time averaging factor.

The ‘tuned time-averaged EIRP power’ is the product of: the linear transmitter output power that the lab measured which includes the embedded duty cycle; the usage rate; 1 plus the tune-up tolerance; and any positive antenna gain expressed as a linear factor. Since the lab’s measurement instrumentation uncertainty is within the allowed limits, no uncertainty adjustment is applied.

The calculation of exposure goes by two names. The preferred name is Exposure Reference Level (ERL), though the older name in some standards is Maximum Permissible Exposure (MPE). This record speaks of Exposure or ERL to cover both terms.

When ERL is calculated, ‘power density at distance’ divides the power just calculated by the surface area of a sphere having a radius equal to the separation distance. The exposure ratio is the power density at the exposure distance divided by the exposure reference level (ERL). The ERL is calculated based on formulas provided in the standards, usually RSS-102 which is more strict. For convenience of the reader, the distance is also calculated at which the user would experience radiofrequency energy at the exposure reference level.

The analysis below deals with the most stringent requirements among the standards cited and may impose limits more strict than any particular standard. Different radio services in the device under test may be subject to different rules. To pass the requirement, the unit must be exempt from routine evaluation, or the exposure ratio must be no greater than 1.

Duty cycle and RF Exposure Results
Each measurement is made conducted from the antenna port with the transmitter on a specified channel and in a selected transmission protocol. The data record length is 100 msec for the Bluetooth-like protocols.

The analytical method reports the power in linear units, such as milliwatt, where the level is averaged over the measurement record. In addition, short-time duty cycle is reported since this is a portion of the over-all 6-minute time averaging result but this factor is not double-counted in the final result for tuned time-averaged EIRP power. The key question addressed is whether the transmitters require further detailed analysis as described in the standards, or whether the exposure levels are so low that they are exempt from that further analysis.

Where standards cited here apply harmonized test methods and different limits, the more strict limit has applied. The results are shown below.

Frequency	(MHz)	2402	2403	2404	2440	2478	2479	2480
BT Low Energy	1 Mbps	**2.17**	**NT**	**NT**	**2.07**	**NT**	**NT**	**1.96**
BT Low Energy	2 Mbps	**NT**	**NT**	**2.19**	**2.10**	**1.99**	**NT**	**NT**
ANT	----	**2.62**	**NT**	**NT**	**2.50**	**NT**	**NT**	**2.36**

Table TR01a.2: Transmit Power Summary in mW with RF Exposure analytical methods

Frequency	(MHz)	2402	2403	2404	2440	2478	2479	2480
BT Low Energy	1 Mbps	**0.787**	**NT**	**NT**	**0.787**	**NT**	**NT**	**0.787**
BT Low Energy	2 Mbps	**NT**	**NT**	**0.813**	**0.813**	**0.813**	**NT**	**NT**
ANT	----	**0.963**	**NT**	**NT**	**0.963**	**NT**	**NT**	**0.963**

Table TR01a.3: Duty cycle embedded in power measurements

Parameter	**Unit**	**Value**
Radio type	**---**	**ANT**
Lowest Tx frequency	MHz	2402
Highest Tx frequency	MHz	2480
Separation distance	cm	20
Tx power to antenna	mW	2.62
Duty cycle embedded above	unitless	0.963
Antenna gain (unused if neg)	dBi	3.22
Usage Rate	unitless	1.000
6-min time averaging factor	unitless	1.0
Tune-up tolerance	%	5.0
Tuned time-averaged EIRP power	**mW**	**5.8**
Controlled Environment?	----	No
Basic exemption level	mW	308.5
Body/Limb use	----	Not worn
Body/Limb multiplier	unitless	1
Final exemption level	**mW**	**308.5**
Judgment:		**Exempt**

Table TR01a.4: Analysis of whether ANT results meet the exemption level

Parameter	Unit	Value
Radio type	---	**BLE**
Lowest Tx frequency	MHz	2402
Highest Tx frequency	MHz	2480
Separation distance	cm	20
Tx power to antenna	mW	2.19
Duty cycle embedded above	unitless	0.813
Antenna gain (unused if neg)	dBi	3.22
Usage Rate	unitless	1.000
6-min time averaging factor	unitless	0.8
Tune-up tolerance	%	5.0
Tuned time-averaged EIRP power	**mW**	**4.8**
Controlled Environment?	----	No
Basic exemption level	mW	308.5
Body/Limb use	----	Not worn
Body/Limb multiplier	unitless	1
Final exemption level	**mW**	**308.5**
Judgment:		**Exempt**

Table TR01a.5: Analysis of whether the Bluetooth Low Energy radio results meet the exemption level

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

Setup Diagram

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

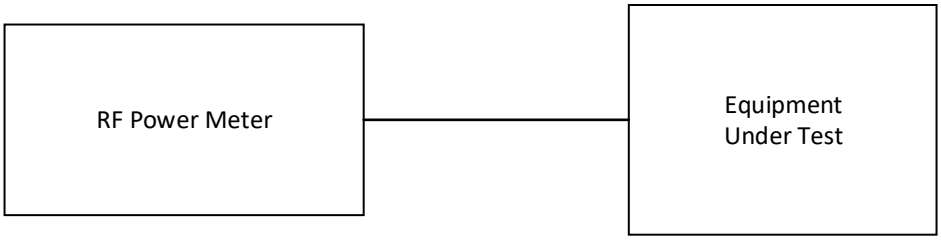

Figure TR01a.1: Test equipment setup

This line is the end of the test record.

Test Record
Transmitter Power, Duty Cycle and RF Exposure
Test IDs TR01b
Project GCL0296

Test Date(s)	21-23 Aug, 16 Nov, 05, 08 Dec 2023
Test Personnel	Jim Solum supervised by Majid Farah
Product Model	A03996
Serial Number tested	443220748
Operating Mode	M12 (All Tx on)
Arrangement	A2 (Laptop)
Input Power	5Vdc
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	2.36 dBi, BLE and ANT as reported by the client
Radio Protocol	IEEE 802.11b/g/n
Separation distance	20 cm, distance from EUT to user as reported by the client
Pass/Fail Judgment:	**EXEMPT from further detailed analysis**
Test record created by:	**Majid Farah**
Date of this record:	**26 Apr 2024**

Original record, Version A.

Test Equipment Used

Description	Make	Model #	Serial #	Last Cal/Ver	Next Due
PXE Receiver 44GHz	Keysight	N9048B	MY62220139	30-Jan-2023	1-Feb-2024
Thermometer	Thermco	ACCD370P	220608121	26-Aug-2022	1-Sep-2024
DMM Multimeter	FLUKE	79 III	71740743	5-Apr-2023	1-Apr-2024
Programmable DC power source	Keithley	2260B-30-72 720 W	1411917	21-Apr-2023	15-Apr-2024
Thermal Chamber	Tenney	T2RC	31244	Calibration	Not Required
RF Power Sensor	Rohde&Schwarz	NRP8S	109927	7-Jul-2023	1-Jul-2024
RF Power Sensor	Rohde&Schwarz	NRP8S	109124	18-Jul-2023	15-Jul-2025

Table TR01b.1: List of test equipment used

Software used: Rohde & Schwarz Power Viewer V11.3, TimePowerAnalysisSpreadsheetv10.xls, PXE Software Revision A.33.03, RFExposurev1.xls

See test record TR01 for power measurement details. The focus of this test record is on duty cycle and RF exposure data. All measured power data extracted from TR01.

Test Method
The test method used in the Garmin Compliance Lab is to take RF power data in a way that is analyzed according to the rules of multiple compatible standards. The data here was previously reported with the data analysis results using the methods of the following test standards

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

See test record TR01 for power measurement details. The focus on this test record is on duty cycle and RF exposure data. This test record expands on the exact same raw data set of TR01 and provides the data analysis according to the methods used for duty cycle and RF exposure evaluation.

RF Exposure Test Background

RF Exposure testing typically takes one of three routes: exemption from routine evaluation by analysis, calculation of exposure, or determination of specific absorption rate (SAR). SAR applies at transmission frequencies below 6 GHz used closer than 20 cm, unless an exemption can be applied. Clients whose products require SAR measurements are required to seek that detailed RF exposure evaluation elsewhere.

The exemption and exposure calculation paths both rely on a combination of measured values and detail provided by the client. Examples of measured values are:

- RF power delivered to an antenna, which is measured with a fast diode-based RF power meter
- Electric or magnetic field components at a distance, measured on a radio test range at 3 m distance
- RF signal short term duty cycle, which is embedded in the RF power meter or electric/magnetic field data

Note that the RF power meter data set analyzed and reported in this section is the same data set used for the analysis in the RF Power and Timing section of the test record TR01.

Detail provided by the client are:

- Antenna gain in the peak direction, referenced to an ideal isotropic antenna
- The separation distance between the product under test and a user or other person

The standards typically allow power to be averaged in linear power units over a period of 6 minutes. That is divided into two distinct factors: duty cycle and usage rates. The RF power meter reads peak power levels over a measurement duration of up to 1 second. Embedded in that data set is a short term duty cycle that is attributable to the types of signals being transmitted, and the low level radio protocol details. It deals with sub-second timing. The usage rate is a factor based on how often and how long a product could transmit and is often based on user behaviors. Usage rate analyzes what happens over several seconds or minutes of time. These two factors are multiplied to determine the complete 6-minute time averaging factor.

The ‘tuned time-averaged EIRP power’ is the product of: the linear transmitter output power that the lab measured which includes the embedded duty cycle; the usage rate; 1 plus the tune-up tolerance; and any positive antenna gain expressed as a linear factor. Since the lab’s measurement instrumentation uncertainty is within the allowed limits, no uncertainty adjustment is applied.

The calculation of exposure goes by two names. The preferred name is Exposure Reference Level (ERL), though the older name in some standards is Maximum Permissible Exposure (MPE). This record speaks of Exposure or ERL to cover both terms.

When ERL is calculated, ‘power density at distance’ divides the power just calculated by the surface area of a sphere having a radius equal to the separation distance. The exposure ratio is the power density at the exposure distance divided by the exposure reference level (ERL). The ERL is calculated based on formulas provided in the standards, usually RSS-102 which is more strict. For convenience of the reader, the distance is also calculated at which the user would experience radiofrequency energy at the exposure reference level.

The analysis below deals with the most stringent requirements among the standards cited and may impose limits more strict than any particular standard. Different radio services in the device under test may be subject to different rules. To pass the requirement, the unit must be exempt from routine evaluation, or the exposure ratio must be no greater than 1.

Duty cycle and RF Exposure Results
Each measurement is made conducted from the antenna port with the transmitter on a specified channel and in a selected transmission protocol. The data record length is 1 sec for IEEE 802.11b/g/n signals.

The analytical method reports the power in linear units, such as milliwatt, where the level is averaged over the measurement record. In addition, short-time duty cycle is reported since this is a portion of the over-all 6-minute time averaging result but this factor is not double-counted in the final result for tuned time-averaged EIRP power. The key question addressed is whether the transmitters require further detailed analysis as described in the standards, or whether the exposure levels are so low that they are exempt from that further analysis.

Where standards cited here apply harmonized test methods and different limits, the more strict limit has applied. The results are shown below.

Mode	Speed	1	2	3	4	5	6	7	8	9	10	11
B	1	**45.71**	**NT**	**NT**	**NT**	**NT**	**46.23**	**NT**	**NT**	**NT**	**NT**	**47.86**
B	2	**43.53**	**NT**	**NT**	**NT**	**NT**	**44.79**	**NT**	**NT**	**NT**	**NT**	**45.95**
B	5.5	**40.48**	**NT**	**NT**	**NT**	**NT**	**39.77**	**NT**	**NT**	**NT**	**NT**	**40.81**
B	11	**42.07**	**NT**	**NT**	**NT**	**NT**	**42.17**	**NT**	**NT**	**NT**	**NT**	**43.25**
G	6	**22.67**	**NT**	**NT**	**NT**	**NT**	**45.01**	**NT**	**NT**	**NT**	**NT**	**23.77**
G	9	**21.92**	**NT**	**NT**	**NT**	**NT**	**43.51**	**NT**	**NT**	**NT**	**NT**	**23.17**
G	12	**20.78**	**NT**	**NT**	**NT**	**NT**	**41.91**	**NT**	**NT**	**NT**	**NT**	**21.61**
G	18	**19.29**	**NT**	**NT**	**NT**	**NT**	**38.65**	**NT**	**NT**	**NT**	**NT**	**20.24**
G	24	**18.43**	**NT**	**NT**	**NT**	**NT**	**23.61**	**NT**	**NT**	**NT**	**NT**	**19.28**
G	36	**16.90**	**NT**	**NT**	**NT**	**NT**	**22.36**	**NT**	**NT**	**NT**	**NT**	**18.00**
G	48	**15.93**	**NT**	**NT**	**NT**	**NT**	**16.03**	**NT**	**NT**	**NT**	**NT**	**16.29**
G	54	**15.37**	**NT**	**NT**	**NT**	**NT**	**15.62**	**NT**	**NT**	**NT**	**NT**	**15.92**
N	MCS0	**20.39**	**NT**	**NT**	**NT**	**NT**	**40.65**	**NT**	**NT**	**NT**	**NT**	**21.07**
N	MCS1	**18.01**	**NT**	**NT**	**NT**	**NT**	**36.18**	**NT**	**NT**	**NT**	**NT**	**18.84**
N	MCS2	**16.62**	**NT**	**NT**	**NT**	**NT**	**33.78**	**NT**	**NT**	**NT**	**NT**	**17.64**
N	MCS3	**15.76**	**NT**	**NT**	**NT**	**NT**	**19.91**	**NT**	**NT**	**NT**	**NT**	**16.12**
N	MCS4	**13.77**	**NT**	**NT**	**NT**	**NT**	**17.64**	**NT**	**NT**	**NT**	**NT**	**14.38**
N	MCS5	**12.78**	**NT**	**NT**	**NT**	**NT**	**16.51**	**NT**	**NT**	**NT**	**NT**	**13.49**
N	MCS6	**12.34**	**NT**	**NT**	**NT**	**NT**	**12.70**	**NT**	**NT**	**NT**	**NT**	**13.05**
N	MCS7	**11.97**	**NT**	**NT**	**NT**	**NT**	**12.37**	**NT**	**NT**	**NT**	**NT**	**12.63**

Table TR01b.2: Transmit Power Summary in mW with RF Exposure analytical methods

Duty cycle embedded in power measurements for IEEE 802.11b/g/n was at 1.00 (unitless).

Parameter	**Unit**	**Value**
Radio type	**---**	**IEEE 802.11 b/g/n**
Lowest Tx frequency	MHz	2402
Highest Tx frequency	MHz	2480
Separation distance	cm	20
Tx power to antenna	mW	47.86
Duty cycle embedded above	unitless	1.00
Antenna gain (unused if neg)	dBi	2.36
Usage Rate	unitless	1.000
6-min time averaging factor	unitless	1.000
Tune-up tolerance	%	5.0
Tuned time-averaged EIRP power	**mW**	**86.5**
Controlled Environment?	----	No
Basic exemption level	mW	308.5
Body/Limb use	----	Not worn
Body/Limb multiplier	unitless	1
Final exemption level	**mW**	**308.5**
Judgment:		**Exempt**

Table TR01b.3: Analysis of whether IEEE 802.11b/g/n results meet the exemption level

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

Setup Diagram

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

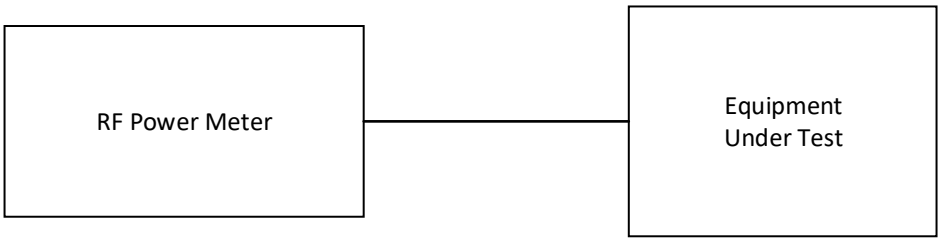

Figure TR01b.1: Test equipment setup

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.