

FCC Test Report

Product Name	Bike Navigation computer
Model No.	ROX GPS 12.0
FCC ID.	M5LROX-12-0

Applicant	SIGMA-ELEKTRO GMBH
Address	DrJulius-Leber-Str. 15, 67433 Neustadt a. d. Weinstrase

Date of Receipt	May 25, 2017
Issued Date	Sep 27, 2017
Report No.	1750612R-RFUSP23V00
Report Version	V2.0
ANNING.	



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date: Sep 27, 2017 Report No.: 1750612R-RFUSP23V00

DEKRA

Product Name	Bike Navigation computer		
Applicant	SIGMA-ELEKTRO GMBH		
Address	DrJulius-Leber-Str. 15, 67433 Neustadt a. d. Weinstrase		
Manufacturer	SIGMA-ELEKTRO GMBH		
Model No.	ROX GPS 12.0		
FCC ID.	M5LROX-12-0		
EUT Rated Voltage	DC 3.7V (Power by Battery) or DC 5V (Power by USB)		
EUT Test Voltage	DC 5V (Power by USB)		
Trade Name	SIGMA-ELEKTRO GMBH		
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016		
	ANSI C63.4: 2014, ANSI C63.10: 2013		
Test Result	Complied		

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Bike Navigation computer	
Trade Name	SIGMA-ELEKTRO GMBH	
Model No.	ROX GPS 12.0	
FCC ID.	M5LROX-12-0	
Frequency Range	2402 – 2480MHz	
Channel Number	79	
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)	
Antenna Type	Ceramic PIFA Antenna	
Channel Control	Auto	
Antenna Gain	Refer to the table "Antenna List"	

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	SIGMA-ELEKTRO GMBH	N/A	Ceramic PIFA Antenna	1.1 dBi for 2.4 GHz

Note: The antenna of EUT is conforming to FCC 15.203.



Center Frequency of Each Channel:

<u> </u>	•						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

- 1. The EUT is a Bike Navigation computer with a 2.4GHz WLAN
 Bluetooth and ANT+ transceiver, this report for Bluetooth.
- 2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
- 3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit - 1Mbps
	Mode 2: Transmit - 2Mbps
	Mode 3: Transmit - 3Mbps

1.2. Operational Description

The EUT is a Bike Navigation computer with built-in Bluetooth V2.1+EDR transceiver. The number of the channels is 79 in 2402-2480MHz. This device provides three kinds of transmitting speed and modulation, respectively GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps). The antenna is Ceramic PIFA Antenna.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 79 channels and over the minimum number of hopping channels (75 channels).

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.

The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

This equipment includes WLAN Bluetooth and ANT+, which can not transmit signals simultaneously.

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Mode 1 & Mode 3

Prod	uct	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	CY9FJC2	N/A
		1			L

Signal Cable Type		Signal cable Description
А	Micro USB to USB Cable	Non-Shielded, 1.5m

Mode 2

Prod	uct	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	416FJC2	N/A
2	Bluetooth Tester	Anritsu	MT8852B	6K00006247	N/A

Sign	al Cable Type	Signal cable Description
А	Micro USB to USB Cable	Non-Shielded, 1.5m



1.4. Configuration of Tested System

Mode 1 & Mode 3



Mode 2





1.5. EUT Exercise Software

Mode 1 & Mode 3

- 1. Setup the EUT as shown in Section 1.4.
- 2. Execute software "Ant RF Test App (Ver 1.00.00)" on the EUT.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Press "OK" to start the continuous Transmit.
- 5. Verify that the EUT works properly.

Mode 2

- 1. Setup the EUT as shown in Section 1.4.
- 2. The EUT is Controlled by the Bluetooth Tester.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Press "OK" to start the continuous Transmit.
- 5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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http://www.dekra.com.tw/english/about/certificates.aspx?bval=5

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	TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286			
	E-Mail: info.tw@dekra.com			

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
Х	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
Х	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
Х	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked with "X" are used to measure the final test results.

3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	Spectrum Analyzer	R&S	FSV30	103464	2017.01.09	2018.01.08
Х	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
Х	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
Х	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
Х	Bluetooth Tester	Anritsu	MT8852B	6K00006247	2017.08.15	2018.08.14

Note:

1. All equipments are calibrated every one year.

2. The test instruments marked with "X" are used to measure the final test results.

3. Test Software version : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
Х	Loop Antenna	TESEQ	HLA6121	37133	2016.03.18	2018.03.17
Х	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.13	2018.02.12
Х	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
Х	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
Х	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
Х	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
Х	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
Х	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
Х	Filter	MICRO TRONICS	BRM50702	G249	2017.08.11	2018.08.10
	Filter	MICRO TRONICS	BRM50716	G187	2017.08.16	2018.08.15
Х	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
Х	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
Х	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
Х	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

Note:

1. Loop Antenna is calibrated every two year, the other equipments are calibrated every one year.

2. The test instruments marked with "X" are used to measure the final test results.

3. Test Software version : QuieTek EMI 2.0 V2.1.113



2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit				
Frequency	Limits			
MHz	QP	AV		
0.15 - 0.50	66-56	56-46		
0.50-5.0	56	46		
5.0 - 30	60	50		

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.4. Uncertainty

±2.35dB



2.5. Test Result of Conducted Emission

Product	:	Bike Navigation computer
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test Mode	:	Mode 3: Transmit - 3Mbps (2441MHz)
Test Date	:	2017/06/21

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.159	9.705	39.748	49.453	-16.290	65.743
0.500	9.737	26.532	36.269	-19.731	56.000
0.940	9.753	18.134	27.888	-28.112	56.000
2.200	9.802	15.823	25.625	-30.375	56.000
3.400	9.836	18.761	28.597	-27.403	56.000
9.900	10.000	19.219	29.219	-30.781	60.000
Average					
0.159	9.705	23.563	33.268	-22.475	55.743
0.500	9.737	20.689	30.426	-15.574	46.000
0.940	9.753	13.269	23.022	-22.978	46.000
2.200	9.802	7.641	17.443	-28.557	46.000
3.400	9.836	9.487	19.323	-26.677	46.000
9.900	10.000	14.762	24.762	-25.238	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.

2. " " means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor



Product Test Item Power Line Test Mode Test Date	 Bike Na Conduct Line 2 Mode 3: 2017/06 	vigation computer ted Emission Test Transmit - 3Mbp /21	s (2441MHz)		
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.159	9.697	41.966	51.662	-14.081	65.743
0.480	9.725	27.689	37.414	-19.157	56.571
0.940	9.753	18.682	28.436	-27.564	56.000
2.200	9.802	17.954	27.756	-28.244	56.000
3.400	9.836	19.733	29.568	-26.432	56.000
10.000	9.996	11.261	21.257	-38.743	60.000
Average					
0.159	9.697	24.256	33.953	-21.790	55.743
0.480	9.725	19.529	29.254	-17.317	46.571
0.940	9.753	14.179	23.933	-22.067	46.000
2.200	9.802	9.919	19.721	-26.279	46.000
3.400	9.836	10.253	20.089	-25.911	46.000
10.000	9.996	6.885	16.881	-33.119	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.

2. "____" means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor



3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.4. Uncertainty

±0.86 dB



3.5. Test Result of Peak Power Output

Product	:	Bike Navigation computer
Test Item	:	Peak Power Output
Test Mode	:	Mode 1: Transmit - 1Mbps
Test Date	:	2017/06/03

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	7.64	1 Watt= 30 dBm	Pass
Channel 39	2441.00	8.48	1 Watt= 30 dBm	Pass
Channel 78	2480.00	9.09	1 Watt= 30 dBm	Pass



Product	:	Bike Navigation computer
Test Item	:	Peak Power Output
Test Mode	:	Mode 2: Transmit - 2Mbps
Test Date	:	2017/09/26

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	6.58	1 Watt= 30 dBm	Pass
Channel 39	2441.00	7.15	1 Watt= 30 dBm	Pass
Channel 78	2480.00	8.43	1 Watt= 30 dBm	Pass



Product	:	Bike Navigation computer
Test Item	:	Peak Power Output
Test Mode	:	Mode 3: Transmit - 3Mbps
Test Date	:	2017/06/03

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	7.29	1 Watt= 30 dBm	Pass
Channel 39	2441.00	8.11	1 Watt= 30 dBm	Pass
Channel 78	2480.00	8.63	1 Watt= 30 dBm	Pass



4. Radiated Emission

4.1. Test Setup



4.2. Limits

> General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits					
Frequency MHz	Field strength	Measurement distance			
	(microvolts/meter)	(meter)			
0.009-0.490	2400/F(kHz)	300			
0.490-1.705	24000/F(kHz)	30			
1.705-30	30	30			
30-88	100	3			
88-216	150	3			
216-960	200	3			
Above 960	500	3			

Remarks: 1. RF Voltage $(dBuV) = 20 \log RF$ Voltage (uV)

- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

4.4. Uncertainty

Horizontal polarization :

30-300MHz: ±4.08dB ; 300M-1GHz: ±3.86dB ; 1-18GHz: ±3.77dB ; 18-40GHz: ±3.98dB Vertical polarization :

30-300MHz: ±4.81dB ; 300M-1GHz: ±3.87dB ; 1-18GHz : ±3.83dB ; 18-40GHz: ±3.98dB



Product	: Bike Navigation computer						
Test Item	: Harmonic Radiated Emission						
Test Mode	: Mode 1: Transmit - 1Mbps(2402MHz)						
Test Date	: 2017/06	/01					
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$		
Horizontal							
Peak Detector:							
4804.000	-3.773	44.380	40.607	-33.393	74.000		
7206.000	-0.784	45.930	45.145	-28.855	74.000		
9608.000	1.052	43.510	44.563	-29.437	74.000		
Average							
Detector:							
					54.000		
Vertical							
Peak Detector:							
4804.000	-3.773	44.620	40.847	-33.153	74.000		
7206.000	-0.784	46.180	45.395	-28.605	74.000		
9608.000	1.052	43.480	44.533	-29.467	74.000		
Average							
Detector:							
					54.000		

4.5. Test Result of Radiated Emission

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Bike Navigation computer
Test Item	:	Harmonic Radiated Emission
Test Mode	:	Mode 1: Transmit - 1Mbps(2441MHz)
Test Date	:	2017/06/01

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4882.000	-3.770	44.280	40.510	-33.490	74.000
7323.000	-0.712	45.700	44.988	-29.012	74.000
9764.000	1.371	42.470	43.842	-30.158	74.000
Average					
Detector:					
					54.000
Vertical					
Peak Detector:					
4882.000	-3.770	44.710	40.940	-33.060	74.000
7323.000	-0.712	45.340	44.628	-29.372	74.000
9764.000	1.371	42.410	43.782	-30.218	74.000
Average					
Detector:					
					54.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Limit

Product Test Item Test Mode Test Date	 Bike Na Harmon Mode 1 2017/06 	vigation compute ic Radiated Emise : Transmit - 1Mbp //01	er sion os(2480MHz)	
Frequency	Correct	Reading	Measurement	Margin
	Factor	Level	Level	
MHz	dB	dBµV	dBµV/m	dB

MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4960.000	-3.732	44.050	40.318	-33.682	74.000
7440.000	-0.646	45.540	44.893	-29.107	74.000
9920.000	1.687	42.670	44.357	-29.643	74.000
Average					
Detector:					
					54.000
Vertical					
Peak Detector:					
4960.000	-3.732	44.640	40.908	-33.092	74.000
7440.000	-0.646	45.870	45.223	-28.777	74.000
9920.000	1.687	42.620	44.307	-29.693	74.000
Average					
Detector:					
					54.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: Bike Navigation computer						
Test Item	: Harmonic Radiated Emission						
Test Mode	: Mode 2: Transmit - 2Mbps(2402MHz)						
Test Date	: 2017/09/26						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBμV	$dB\mu V/m$	dB	dBµV/m		
Horizontal							
Peak Detector:							
4804.000	-3.773	45.850	42.077	-31.923	74.000		
7206.000	-0.784	46.580	45.796	-28.204	74.000		
9608.000	1.052	43.180	44.232	-29.768	74.000		
Average							
Detector:							
					54.000		
Vertical							
Peak Detector:							
4804.000	-3.773	46.520	42.747	-31.253	74.000		
7206.000	-0.784	47.550	46.766	-27.234	74.000		
9608.000	1.052	43.160	44.212	-29.788	74.000		
Average							
Detector:							
					54.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Test Item Test Mode Test Date	 Bike Navigation computer Harmonic Radiated Emission Mode 2: Transmit - 2Mbps (2441MHz) 2017/09/26 						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBµV	dBµV/m	dB	dBµV/m		
Horizontal							
Peak Detector:							
4882.000	-3.770	45.620	41.850	-32.150	74.000		
7323.000	-0.712	47.510	46.798	-27.202	74.000		
9764.000	1.371	43.690	45.061	-28.939	74.000		
Average							
Detector:							
					54.000		
Vertical							
Peak Detector:							
4882.000	-3.770	45.360	41.590	-32.410	74.000		
7323.000	-0.712	46.820	46.108	-27.892	74.000		
9764.000	1.371	43.180	44.551	-29.449	74.000		
Average							
Detector:							
					54.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Test Item	: Bike Navigation computer Harmonic Radiated Emission							
Test Mode	Mode 2: Transmit 2Mbrs (2480MHz)							
Test Date	· 2017/09	/26	S (24001/112)					
Test Dute	. 2017/07/	20						
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m			
Horizontal								
Peak Detector:								
4960.000	-3.732	45.850	42.118	-31.882	74.000			
7440.000	-0.646	46.310	45.664	-28.336	74.000			
9920.000	1.687	43.850	45.537	-28.463	74.000			
Average								
Detector:								
					54.000			
Vertical								
Peak Detector:								
4960.000	-3.732	45.740	42.008	-31.992	74.000			
7440.000	-0.646	46.740	46.094	-27.906	74.000			
9920.000	1.687	43.640	45.327	-28.673	74.000			
Average								
Detector:								
					54.000			

=

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: Bike Navigation computer							
Test Item	: Harmonic Radiated Emission							
Test Mode	: Mode 3: Transmit - 3Mbps(2402MHz)							
Test Date	: 2017/06/01							
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level	-				
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m			
Horizontal								
Peak Detector:								
4804.000	-3.773	44.760	40.987	-33.013	74.000			
7206.000	-0.784	45.610	44.825	-29.175	74.000			
9608.000	1.052	42.030	43.083	-30.917	74.000			
Average								
Detector:								
					54.000			
Vertical								
Peak Detector:								
4804.000	-3.773	45.490	41.717	-32.283	74.000			
7206.000	-0.784	46.190	45.405	-28.595	74.000			
9608.000	1.052	42.050	43.103	-30.897	74.000			
Average								
Detector:								
					54.000			

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Test Item Test Mode Test Date	 Bike Navigation computer Harmonic Radiated Emission Mode 3: Transmit - 3Mbps (2441MHz) 2017/06/01 						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBµV	dBµV/m	dB	dBµV/m		
Horizontal							
Peak Detector:							
4882.000	-3.770	44.120	40.350	-33.650	74.000		
7323.000	-0.712	46.600	45.888	-28.112	74.000		
9764.000	1.371	42.850	44.222	-29.778	74.000		
Average							
Detector:							
					54.000		
Vertical							
Peak Detector:							
4882.000	-3.770	44.770	41.000	-33.000	74.000		
7323.000	-0.712	45.780	45.068	-28.932	74.000		
9764.000	1.371	42.730	44.102	-29.898	74.000		
Average							
Detector:							
					54.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: Bike Navigation computer							
Test Item	: Harmonic Radiated Emission							
Test Mode	: Mode 3: Transmit - 3Mbps (2480MHz)							
Test Date	: 2017/06	: 2017/06/01						
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBµV	dBµV/m	dB	dBµV/m			
Horizontal								
Peak Detector:								
4960.000	-3.732	44.150	40.418	-33.582	74.000			
7440.000	-0.646	45.590	44.943	-29.057	74.000			
9920.000	1.687	42.520	44.207	-29.793	74.000			
Average								
Detector:								
					54.000			
Vertical								
Peak Detector:								
4960.000	-3.732	44.730	40.998	-33.002	74.000			
7440.000	-0.646	45.990	45.343	-28.657	74.000			
9920.000	1.687	42.800	44.487	-29.513	74.000			
Average								
Detector:								
					54.000			

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	:	Bike Navigation computer
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit - 1Mbps (2441MHz)
Test Date	:	2017/06/22

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
79.203	-15.244	35.509	20.265	-19.735	40.000
149.493	-10.756	33.126	22.371	-21.129	43.500
202.913	-13.531	41.379	27.849	-15.651	43.500
391.290	-7.822	29.910	22.088	-23.912	46.000
462.986	-6.187	29.737	23.549	-22.451	46.000
552.957	-4.462	29.485	25.023	-20.977	46.000
Vertical					
58.116	-11.732	39.269	27.537	-12.463	40.000
139.652	-11.129	29.445	18.316	-25.184	43.500
270.391	-11.024	30.389	19.364	-26.636	46.000
306.942	-9.924	31.957	22.033	-23.967	46.000
401.130	-7.558	28.830	21.272	-24.728	46.000
498.130	-5.580	29.244	23.665	-22.335	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.



Product	:	Bike Navigation computer
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit - 2Mbps (2441MHz)
Test Date	:	2017/09/26

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
Horizontal					
52.493	-11.212	35.669	24.457	-15.543	40.000
162.145	-10.934	35.587	24.653	-18.847	43.500
318.188	-9.936	37.162	27.226	-18.774	46.000
440.493	-7.085	36.879	29.794	-16.206	46.000
529.058	-5.569	35.198	29.629	-16.371	46.000
613.406	-3.974	37.122	33.148	-12.852	46.000
Vertical					
52.493	-11.212	34.212	23.000	-17.000	40.000
160.739	-10.884	36.335	25.452	-18.048	43.500
257.739	-12.018	36.284	24.267	-21.733	46.000
344.899	-9.328	36.950	27.622	-18.378	46.000
433.464	-7.256	36.202	28.947	-17.053	46.000
522.029	-5.679	36.148	30.469	-15.531	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.



Product Test Item Test Mode Test Date	 Bike Navigation computer General Radiated Emission Mode 3: Transmit - 3Mbps (2441MHz) 2017/06/22 						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level	-			
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m		
Horizontal							
77.797	-14.987	36.221	21.235	-18.765	40.000		
149.493	-10.756	33.300	22.545	-20.955	43.500		
198.696	-13.646	41.798	28.153	-15.347	43.500		
387.072	-7.940	28.849	20.909	-25.091	46.000		
512.188	-5.299	29.492	24.193	-21.807	46.000		
599.348	-3.344	28.858	25.515	-20.485	46.000		
Vertical							
59.522	-11.878	39.126	27.248	-12.752	40.000		
173.391	-11.499	29.543	18.044	-25.456	43.500		
311.159	-9.832	31.868	22.036	-23.964	46.000		
388.478	-7.901	29.526	21.625	-24.375	46.000		
471.420	-6.041	29.524	23.483	-22.517	46.000		
581.072	-3.783	28.223	24.440	-21.560	46.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.



5. **RF Antenna Conducted Test**

5.1. Test Setup



5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

±1.23dB


5.5. Test Result of RF Antenna Conducted Test

Product	:	Bike Navigation computer
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 1: Transmit - 1Mbps
Test Date	:	2017/06/03



Figure Channel 39:



Figure Channel 78:



Note: The above test pattern is synthesized by multiple of the frequency range.

dBm



Product	:	Bike Navigation computer
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 2: Transmit - 2Mbps
Test Date	:	2017/09/26



Figure Channel 39:





Note: The above test pattern is synthesized by multiple of the frequency range.

GHz

15

20

25

10

5



Bike Navigation computer
RF Antenna Conducted Test
Mode 3: Transmit - 3Mbps
2017/06/03





Figure Channel 78:



Note: The above test pattern is synthesized by multiple of the frequency range.



6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

6.4. Uncertainty

Conducted: ±1.23dB Radiated: Horizontal polarization : 1-18GHz: ±3.77dB Vertical polarization : 1-18GHz : ±3.83dB



6.5. **Test Result of Band Edge**

Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2402MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
Channel No. (MH	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2362.609	11.469	37.970	49.439	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	35.997	47.553	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	49.793	61.372			Pass
00 (Peak)	2402.174	11.584	83.809	95.393			
00 (Average)	2390.000	11.556	23.487	35.043	74.00	54.00	Pass
00 (Average)	2400.000	11.579	35.989	47.568			Pass
00 (Average)	2402.029	11.584	70.437	82.021			

Horizontal (Peak)

Figure Channel 00:



Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. Measurement Level = Reading Level + Correction Factor. 1.
- 2. 3.
- 4. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2402MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (VERTICAL):

Channal Ma	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2357.971	11.455	38.298	49.753	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	35.792	47.348	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	44.201	55.780			Pass
00 (Peak)	2402.174	11.584	76.890	88.474			
00 (Average)	2390.000	11.556	23.465	35.021	74.00	54.00	Pass
00 (Average)	2400.000	11.579	31.243	42.822			Pass
00 (Average)	2402.029	11.584	64.956	76.540			

Figure Channel 00:

VERTICAL (Peak)



Figure Channel 00:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.3.
- 4.
- Measurement Level = Reading Level + Correction Factor. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2480MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (Horizontal):

Channel No	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Chamier NO.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2479.877	11.791	87.442	99.233			
78 (Peak)	2483.500	11.800	37.097	48.897	74.00	54.00	Pass
78 (Average)	2480.022	11.791	73.328	85.119			
78 (Average)	2483.500	11.800	24.399	36,199	74.00	54.00	Pass

Figure Channel 78:

Horizontal (Peak)





Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. Measurement Level = Reading Level + Correction Factor. 1.

- 2. 3. 4. 5. 6.
- The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps (2480MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (VERTICAL):

Channal Ma	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.167	11.792	82.890	94.682			
78 (Peak)	2483.500	11.800	36.537	48.337	74.00	54.00	Pass
78 (Peak)	2490.746	11.817	37.023	48.840	74.00	54.00	Pass
78 (Average)	2480.022	11.791	69.760	81.551			
78 (Average)	2483.500	11.800	23.964	35.764	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)



Figure Channel 78:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 1. 2. 3. 4.

- 5. Measurement Level = Reading Level + Correction Factor.
- 6. The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 2Mbps (2402MHz)
Test Date	:	2017/09/26

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Regult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2368.551	11.176	38.329	49.505	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	36.596	48.152	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	59.602	71.181			Pass
00 (Peak)	2402.174	11.584	83.624	95.208			
00 (Average)	2390.000	11.556	24.396	35.952	74.00	54.00	Pass
00 (Average)	2400.000	11.579	41.348	52.927			Pass
00 (Average)	2402.029	11.584	69.152	80.736			



Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.
- 3.
- 4.
- Measurement Level = Reading Level + Correction Factor. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 2Mbps (2402MHz)
Test Date	:	2017/09/26

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2368.406	11.176	38.733	49.909	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	35.990	47.546	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	55.486	67.065			Pass
00 (Peak)	2402.174	11.584	78.860	90.444			
00 (Average)	2390.000	11.556	24.384	35.940	74.00	54.00	Pass
00 (Average)	2400.000	11.579	37.832	49.411			Pass
00 (Average)	2402.029	11.584	65.247	76.831			

Figure Channel 00:

VERTICAL (Peak)



Figure Channel 00:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.3.
- 4.
- Measurement Level = Reading Level + Correction Factor. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 2Mbps (2480MHz)
Test Date	:	2017/09/26

RF Radiated Measurement (Horizontal):

Channel No. Fre	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.167	11.791	85.592	97.383			
78 (Peak)	2483.500	11.800	41.582	53.382	74.00	54.00	Pass
78 (Average)	2480.022	11.791	70.756	82.547			
78 (Average)	2483.500	11.800	25.764	37.564	74.00	54.00	Pass

Figure Channel 78:

Horizontal (Peak)





Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. Measurement Level = Reading Level + Correction Factor. 1.

- 2. 3. 4. 5. 6.
- The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 2: Transmit - 2Mbps (2480MHz)
Test Date	:	2017/09/26

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.022	11.791	81.520	93.311			
78 (Peak)	2483.500	11.800	38.784	50.584	74.00	54.00	Pass
78 (Average)	2480.022	11.791	67.230	77.977			
78 (Average)	2483.500	11.800	25.118	35.755	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)



Figure Channel 78:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level.
- 1. 2. 3.
- 4.
- 5.
- Measurement Level = Reading Level + Correction Factor. The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (2402MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Regult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dBµV/m)	Result
00 (Peak)	2365.797	11.479	37.314	48.794	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	35.920	47.476	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	57.859	69.438			Pass
00 (Peak)	2402.029	11.584	83.843	95.427			
00 (Average)	2390.000	11.556	23.516	35.072	74.00	54.00	Pass
00 (Average)	2400.000	11.579	41.073	52.652			Pass
00 (Average)	2402.029	11.584	68.325	79.909			



Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.
- <u>3</u>.
- 4.
- Measurement Level = Reading Level + Correction Factor. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (2402MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Dogult
	(MHz)	(dB)	$(dB\mu V)$	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2367.246	11.485	36.888	48.373	74.00	54.00	Pass
00 (Peak)	2390.000	11.556	35.204	46.760	74.00	54.00	Pass
00 (Peak)	2400.000	11.579	53.548	65.127			Pass
00 (Peak)	2402.029	11.584	79.244	90.828			
00 (Average)	2390.000	11.556	23.528	35.084	74.00	54.00	Pass
00 (Average)	2400.000	11.579	37.599	49.178			Pass
00 (Average)	2402.029	11.584	64.738	76.322			



VERTICAL (Peak)



Figure Channel 00:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.
- <u>3</u>.
- 4.
- Measurement Level = Reading Level + Correction Factor. 5.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (2480MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (Horizontal):

Channal No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Decult
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.022	11.791	85.806	97.597			
78 (Peak)	2483.500	11.800	35.711	47.511	74.00	54.00	Pass
78 (Peak)	2483.790	11.800	37.672	49.472	74.00	54.00	Pass
78 (Average)	2480.022	11.791	69.619	81.410			
78 (Average)	2483.500	11.800	24.409	36.209	74.00	54.00	Pass

Figure Channel 00:

Horizontal (Peak)



Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2. 3.
- 4. ', means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (2480MHz)
Test Date	:	2017/06/12

RF Radiated Measurement (VERTICAL):

Channel No	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Chamier NO.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
78 (Peak)	2480.022	11.791	81.511	93.302			
78 (Peak)	2483.500	11.800	37.378	49.178	74.00	54.00	Pass
78 (Peak)	2511.181	11.865	38.144	50.009	74.00	54.00	Pass
78 (Average)	2480.022	11.791	66.186	77.977			
78 (Average)	2483.500	11.800	23.955	35.755	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)



Figure Channel 78:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level.
- 1. 2. 3.
- 4. 5.
- Measurement Level = Reading Level + Correction Factor. The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps(Hopping off)

Measurement Level	Result
Δ (dB)	
> 20	PASS



Figure Channel 00:

Figure Channel 78:

The Air			and the second second second second		YBW SUU KH2	Plote	Sweep			
0 dBm-	Ma					M	1[1] 2[1]		2.4801	9.45 dBn 65210 GH: 58.27 dBn 00000 GH:
1		e								
10 484	D	1 -10.5	52 dBm					_		
20 dah									_	
		1								
30 dim	-	n	+ +			_	-			1
1										
40 GBM	-	No.								
50 dBm	-		МЗ							
			M2 LL	lat.						
60 dBm	+		Contracting Specific		de Malada de Standard (1996), 1998 Na California de Standard (1998), 1998	and a stream		dentile en la company		a if godd out on the
70 40										
/U aBm										
tart 2	.478	GHz			32001 p	its			Sto	p 2.5 GHz
arker										
Type	Ref	Trc	X-value		Y-value	Func	tion	Fu	nction Result	
M1		1	2.48016521	GHz	9.45 dBm					
111.4			0 4005	CH2	-58 27 dBm					
M2		1	2.4835	GHZ	30.21 dbm					



- Product : Bike Navigation computer
- Test Item : Band Edge

Test Mode : Mode 2: Transmit - 2Mbps(Hopping off)

Measurement Level	Result
Δ (dB)	
> 20	PASS

Ref L	evel	30.50 dB 30 (m Offset 10.50 dB iB SWT 32.1 ms	 RBW 100 kHz VBW 300 kHz 	Mode Sweep		
1Pk V	iew			1.94			
20 dBm	-				M1[1] M2[1]		4.32 dBr 2.401836850 GH -46.99 dBr 2.400000000 GH
10 dBm						1 1	MI
0 dBm-	+						in
-10 dBn	0		2.400				
-20 dBn	0	1 -15.07	/ upin				
-30 dBn	n -					M	hay
-40 dBn	n+					MM2	
50 dBr			Ally shy Arm Shi to Playtin to an	A STATE AND A STAT			' `
-60 dBn	n						
Start 2	2.39 G	Hz		32001 p	ts		Stop 2.404 GHz
larker							
Туре	Ref	Trc	X-value	Y-value	Function	Funct	tion Result
M1 M2		1	2.40183685 GHz	4.32 dBm			
201		1	2.4 GHZ	-40.99 dBm			

Figure Channel 00:

Date: 25.SEP.2017 05:58:21

Att		30 (18 SWT 32.1 ms	• VBW 300 kHz	Mode Sweep		
20 d8m	IEW I				M1[1] M2[1]	5.1 2.4798400 -52.4 2.4835000	27 dBm 40 GHz 30 dBm 00 GHz
0 dBm-	h						
o court		6					
-10 dBr -20 dBr	D	-14.72	7 dBm				
-30 dEn	n	1		-			
O diBr	n	٦					Ma
50 dBr	n				and the second sec		a dana jira. Mangangkan
-60 dBr	n						
Start 2	2.478	GHz		32001 p	ts	Stop 2.	5 GHz
larker							
Туре	Ref	Trc	X-value	Y-value	Function	Function Result	
M1		1	2.4/984004 GHZ	-527 dBm			
M2		1	2.4835 GHZ	-52.80 dBm			

Figure Channel 78:

Date: 25.SEP.2017 07:26:42



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (Hopping off)

Measurement Level	Result
Δ (dB)	
> 20	PASS



Figure Channel 00:

Figure Channel 78:

Spectrum					P
Ref Level	20.50 di 30	Bm Offset 0.50 dB dB SWT 32.1 ms	RBW 100 kHz VBW 300 kHz	Mode Sweep	201
1Pk View					
10 d8m M1				M1[1] M2[1]	8.30 dB 2.480156280 G -54.29 dB 2.483500000 G
	1				
-10 d8m-	1 .116	dam dam	_		
-20 dam	1				
Madm	4				
HU dBm-					
-50 dBm-	Y	M2-M3			
-60 dBm		And the second second	the protocol of the protocol of	and the second	
-70 dBm					
Start 2.478	GHz		32001 pt	s	Stop 2.5 GH
Marker					
Type Ref	Trc	X-value	Y-value	Function	Function Result
M1	1	2.48015628 GHz	8.30 dBm		
M2	1	2.4835 GHz	-54.29 dBm		
M3	1	2.48412425 GHz	-53.35 dBm		
	1			Measuring.	01052017



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 1: Transmit - 1Mbps(Hopping on)

Measurement Level	Result
Δ (dB)	
> 20	PASS



Figure Channel Hopping:







Product	:	Bike Navigation computer
Test Item	:	Band Edge

Mode 2: Transmit - 2Mbps (Hopping on) Test Mode :

Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel Hopping:

Spectr	um		_	22.0.22		_						(W
Ref Le	vel	30.50 dB 30 d	B SWT	10.50 dB 1 32.1 ms	 RBW 100 VBW 300 	kHz kHz	Mode	Sweep	p			
1Pk Vie	w											
					1	1	M	1[1]			101100	5.50 dBr
20 d8m-	+		-	-	-	+	м	2[1]			2.401	48.84 dBr
10 d8m-	+			-	-	+	-	-	- 1		M1	
0 dBm	+		-	-	-	-	_		_		A	1
10 dBm-			-		-				_		1	1. 1. 1.
-20 dBm-	-0	1 -14.50	3 dBm	-	-	-			_		1	-
-30 dBm-	+		-		-	-			-	line, e	-	
-40 dBm-	+				_	\vdash			МЗ	in the second		
50.d8m				1. (10.00) (10.000) (10.000) (10.000)			ا ه هم مراجع ا			912 I		
-60 dBm-	-					-						
Start 2.	39 G	Hz			3200)1 pt	s				Stop	2.404 GHz
1arker												
Type	Ref	Trc	X-valu	ie	Y-value	1	Func	tion		Fun	ction Resul	lt
M1		1	2.40184	472 GHz	5.50 d	Bm						
M2		1		2.4 GHz	-48.84 d	Bm						
M2		1	2.300463	563 GHz	-46 47 d	Bm						

Date: 25.SEP.2017 06:01:11



Figure Channel Hopping:

Date: 25.SEP.2017 07:49:30



Product	:	Bike Navigation computer
Test Item	:	Band Edge
Test Mode	:	Mode 3: Transmit - 3Mbps (Hopping on)

Measurement Level	Result
Δ (dB)	
> 20	PASS

Spectrum Offset 0.50 dB = RBW 100 kHz SWT 32.1 ms = VBW 300 kHz Ref Level 20.50 dB 30 d8 de Sweep e 1Pk 6.67 dBm 2.402156210 GHz -54.57 dBm 2.400000000 GHz M1[1] 10 dBr M2[1] 0 dB -10 di D1 -13.333 dBm -20 d8r -30 dB -40 dB -50 dBn -70 dBm Start 2.39 GHz 32001 pts Stop 2.404 GHz Marker Type Ref Trc M1 1 M2 1 M3 1 Y-value 6.67 dBm -54.57 dBm -46.87 dBm X-value 2.40215621 GHz 2.4 GHz 2.399884876 GHz Function **Function Result 11**

Figure Channel Hopping:

Figure Channel Hopping:

Spectru Ref Lev	el 2	0.50 dE	am Offset	0.50 dB	RBW 100 kH	2						
Att		30	d8 SWT	32.1 ms 🖷	VBW 300 kH	Z N	1ode	Sweep	(
10 dah-							M	1[1] 2[1]			2.4	7.40 dBm 79046000 GHz -57.33 dBm 83500000 GHz
	1	-				1						1
-10 d8m-	01	-12.60	01 dBm			-	_		-		+	-
-20 d8m-			-			-	_	-	_	-	-	-
-30 dBm-	+	-		-			_	-	_			_
-40 dBm-		and a							_		-	
-50 d8m-	+				_							_
-60 dBm-	+		A STATE OF	Lands Report	الم ومرافع الأوسا		امليزه	after tool		الم الم الم	- Hitte	
-70 dBm—	+											
Start 2.4	78 G	Hz			32001	1 pts						Stop 2.5 GHz
Marker												
Type R	tef	Trc	X-value		Y-value		Func	tion		Fu	nction Res	sult
M1		1	2.4790	46 GHz	7.40 dB	m						
M2		1	2.48	35 GHz	-57.33 dB	m						
M3		1	2.4841991	88 GHz	-54.59 dB	m						
		<u> </u>							-	TRADUCT OF	B 430	03.06.2017



7. Channel Number

7.1. Test Setup



7.2. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

7.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

N/A



7.5. Test Result of Channel Number

Product	:	Bike Navigation computer
Test Item	:	Channel Number
Test Mode	:	Mode 1: Transmit - 1Mbps

Frequency Range	Measurement	Required Limit	Result
(MHz)	(Hopping Channel)	(Hopping Channel)	
$2402 \sim 2480$	79	>75	Pass



2442-2461MHz

2462-2480MHz

Ref Levi	el 20	SD dBm 30 dB	SWT	\$0 dB = 1	VBW 100 kH	Mode	Sweep				Ref Li	evel	20.50 dBr 30 dl	B SWT	1 ms -	VBW 100 kH	2 Mode	Sweep			
1Pk View						000000	11.11				1Pk Vi	ew.					0000000	11.11			
MI						M	1(1)		2.4	7.83 dBm 420000 GHz	M1						N	41[1]		2.4	8.21 dBi 620000 CH
And A	P	M	AA	AA	AA	AA		AA	AF	8,36 dmm 61000 GHz	dem	J	NA	M	AM	AA	M	12[2]	W	NA	7063 dBn 809000 GH
-10 dBm		V 1	.w i	N.		(V.	v v	1	V V		-10 dbn -20 dBn	1								Y	1
-30 dBm		-	-						1	-	-30 dBm	+						-	-	-	4
-40 dBm-	\vdash										-40 dBm	+									+ 1
-50 dBm-	\vdash										-50 dBm	+							-	<u> </u>	+
-60 dBm	\top										-60 dBm	` †									
-70 dBm-											-70 dBm) 									
Start 2.44	rt 2.4415 GHz 1001 pts Stop 2.4615 GHz							Start 2	.4613	5 GHz			1001	pts			Stop 2	2.4815 GHz			
Marker Type R M1	ef T	1	X-value	12 GHz	Y-value 7.83 de	m Func	tion	Fune	ction Resu	lt	Marker Type M1	Ref	Trc 1	X-value 2.4	62 GHz	Y-value 8.21 dB	Fun	ction	Fun	ction Resu	lt



Product	:	Bike Navigation computer
Test Item	:	Channel Number
Test Mode	:	Mode 2: Transmit - 2Mbps

Frequency Range	ange Measurement Required Limit		Result	
(MHz)	(Hopping Channel)	(Hopping Channel)	Kesuit	
2402 ~ 2480	79	>75	Pass	



2442-2461MHz

2462-2480MHz





Product	:	Bike Navigation computer
Test Item	:	Channel Number
Test Mode	:	Mode 3: Transmit - 3Mbps

Frequency Range	Measurement	Required Limit	Pagult	
(MHz)	(Hopping Channel)	(Hopping Channel)	Kesult	
2402 ~ 2480	79	>75	Pass	

2402-2421MHz

2422-2441MHz



2442-2461MHz

2462-2480MHz





8. Channel Separation

8.1. Test Setup



8.2. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

8.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

8.4. Uncertainty

<u>+</u>279.2Hz



8.5. Test Result of Channel Separation

Product	:	Bike Navigation computer
Test Item	:	Channel Separation
Test Mode	:	Mode 1: Transmit - 1Mbps

	Fraguanay	Measurement	Limit	Limit of (2/3)*20dB	
Channel No.	(MHz)	Level	$(l_{2}\mathbf{U}_{2})$	Dondwidth (1/1/2)	Result
	(IVITIZ)	(kHz)	(кпz)	Bandwidun (KFIZ)	
00	2402	1000	>25 kHz	642.0	Pass
39	2441	1000	>25 kHz	642.0	Pass
78	2480	1000	>25 kHz	642.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

Spectrum Ref Level	20.50 dBr	Offset 0.50 dB	• RBW 100 kHz		r.	
1Pk View	30 u	5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 -	WBW 100 KH2	Mode Sweep		
10 dBm			,Mł	M1[1]		7.03 dBn 2.40200000 GH 7.02 dBn 2.40300000 GH
0 d8m						5500 00 1000
-10 dBm			+	V		
-20 dBm			+			
-30 dBm			N		V	
-40 dBm			A			
-50 dBm	real shifted as an	Auntolited the sheet of press	·		V when has	A monal Under Court Court
-70 dBm						
CF 2.402 GH	Iz		1001 p	ts		Span 10.0 MHz
Marker						
Type Ref	Trc	X-value	Y-value	Function	Fund	ction Result
M1 M2	1	2.402 GHz 2.403 GHz	7.03 dBm 7.02 dBm			
)[]			Measuring		03.06.2017

Channel 00 (2402MHz)



Channel 39 (2441MHz)

OTLV AICH								
10 dBm					(1) (4)		2.441	8.07 dBm 00000 GHz 8.11 dBm 00000 GHz
0 d8m				V	1			
-10 dBm					1			
-20 dBm					1			
-30 dBm			N		l	1		
-40 dBm			Æ			When		
-50 dBm		An and and				www	an and a sh	
-60 dBm	youperlotelypayo	Wark water					- www.	handberthans
-70 dBm								
CF 2.441 G	Hz		1001	pts			Span	10.0 MHz
Marker								
Type Ref	Trc	X-value	Y-value	Funct	on	Fun	ction Result	
M1	1	2.441 GHz	8.07 dBn	n				

Channel 78 (2480MHz)





Product	:	Bike Navigation computer
Test Item	:	Channel Separation
Test Mode	:	Mode 2: Transmit - 2Mbps

	Fraguanay	Measurement	Limit	Limit of (2/3)*20dB	
Channel No.	(MIL-)	Level	(ltuz)	Dandwidth (kUz)	Result
	(MHZ)	(kHz)	(кпz)	Bandwidth (KHZ)	
00	2402	1000	>25 kHz	858.0	Pass
39	2441	1000	>25 kHz	856.0	Pass
78	2480	1000	>25 kHz	856.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

Att	30.50 dBn 30 dB	n Offset 10.50 dB B e SWT 500 ms	 RBW 100 kHz VBW 100 kHz 	Mode Sweep	3	
20 dBm				M1[1] M2[1]		4.31 dBn 2.40200000 GH 4.36 dBn 2.40300000 GH
10 dBm			Mi	Ma		
-10 dBm				~ 7		
-20 dBm						
-30 dBm		m	\sim		hm	
-40 dBm						
259.4BOR	لمهجاتها المرحو الحارة	Manual				Unstan alaman and
-60 dBm						
CF 2.402 G	łz		1001 pt	5		Span 10.0 MHz
Marker Tyne Ref	Trc	X-value	Y-value	Function	Funct	ion Result
M1	1	2.402 GHz	4.31 dBm	. another	- Turice	

Date: 25.SEP.2017 05:57:53



Ref Level	30.50 dBn 30 dB	Offset 10.50 dB	 RBW 100 kHz VBW 100 kHz 	Mode Swee	D	
1Pk View						
20 dBm				M1[1] M2[1]		5.19 dBm 2.44100000 GHz 5.18 dBm 2.44200000 GHz
10 dBm-			MI	M2		
0 dBm			m	~m-		
-10 dBm						
-20 dBm						
-30 dBm		j.m.			han	
-40 dBm						
,	ukradon there	Handrad			union of the	but the ward the state ward
-60 dBm						
CF 2.441 G	lz		1001 pts	5		Span 10.0 MHz
Marker Tyne Ref		X-value	Y-value	Function	Functio	n Result
M1 M2	1	2.441 GHz	5.19 dBm	. unocion	, and the	

Channel 39 (2441MHz)

Date: 25.SEP.2017 07:13:30





Date: 25.SEP.2017 07:26:16



Product	:	Bike Navigation computer
Test Item	:	Channel Separation
Test Mode	:	Mode 3: Transmit - 3Mbps

Channel No.	Fraquanay	Measurement Limit		Limit of (2/3)*20dB	
	(MHz)	Level	(1/1/2)	Dondwidth (1/1/2)	Result
		(kHz)	(кпz)	Ballawidul (KFIZ)	
00	2402	1000	>25 kHz	864.0	Pass
39	2441	1000	>25 kHz	864.0	Pass
78	2480	1000	>25 kHz	860.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.



Channel 00 (2402MHz)



Channel 39 (2441MHz)

10 dBm			~^^	in al			6.60 dBn 2.44100000 GH 6.61 dBn 2.44200000 GH	
0 d8m	-		1		1	-	142040	
-10 dBm								
-20 dBm								
-30 dBm		1	m		1	Long		
-40 dBm							m	
-50 dBm	4	mum v					~~ <u>}</u>	
	workshaph and and a second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			_		5 Marks	duringa
70 dBm								
-70 ubiii								
CF 2.441 0	Hz	1	100	1 pts			Span	10.0 MHz
larker								
Type Re	f Trc	X-value	Y-value	Fun	ction	Fun	ction Result	
M1	1	2.441 GH	2 6.60 d	Bm				

Channel 78 (2480MHz)





9. Dwell Time

9.1. Test Setup



9.2. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

9.4. Uncertainty

 ± 2.31 msec



9.5. Test Result of Dwell Time

Product	:	Bike Navigation computer
Test Item	:	Dwell Time
Test Mode	:	Mode 1: Transmit - 1Mbps (Channel 00,39,78)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.877	13	50	0.75	0.299	0.4	Pass
2441	2.877	13	50	0.75	0.299	0.4	Pass
2480	2.877	13	50	0.75	0.299	0.4	Pass

Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)






DEKRA

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



Product	:	Bike Navigation computer
Test Item	:	Dwell Time
Test Mode	:	Mode 2: Transmit - 2Mbps (Channel 00,39,78)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.877	13	50	0.75	0.299	0.4	Pass
2441	2.877	13	50	0.75	0.299	0.4	Pass
2480	2.877	13	50	0.75	0.299	0.4	Pass

Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)







DEKRA

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



Product	:	Bike Navigation computer
Test Item	:	Dwell Time
Test Mode	:	Mode 3: Transmit - 3Mbps (Channel 00,39,78)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.877	13	50	0.75	0.299	0.4	Pass
2441	2.877	13	50	0.75	0.299	0.4	Pass
2480	2.877	13	50	0.75	0.299	0.4	Pass

Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)





CH 78 Hopping of Number CH 78 Time slot length Ref Le Ref Level 20. Att TRG:VID S0 dB · RBW 1 MHz S0 ms · VBW 1 MHz 0.50 dB - RBW 1 MHz 10 ms - VBW 1 MHz 40 7.31 dBr 2.87712 m 9.60 dBr 3.74625 m M1[1] MZ M2[1] to dB 0 d8 40 dBr A LAN MAN har has and 50 dBr L,I Ч W h U Ψ W W Ψ -60 dBi 70 de -60 dBi CF 2.48 G 1.0. Marker Type Ref Trc M1 1 M2 1 M3 1 X-value 2.87712 ms 3.74625 ms 6.62338 ms Function Function Result 1 Y-value 70 dB .50 CF 2.48 G 1001 pts 5.0 ms

DEKRA

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



10. Occupied Bandwidth

10.1. Test Setup



10.2. Limits

N/A

10.3. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

10.4. Uncertainty

 $\pm 279.2 \mathrm{Hz}$



10.5. Test Result of Occupied Bandwidth

Product	:	Bike Navigation computer
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Mode 1: Transmit - 1Mbps

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	963		NA
39	2441	963		NA
78	2480	963		NA

Spectrum Ref Level 20.50 dBm Offset 0.50 dB . RBW 30 kHz Att 30 dB SWT 1.1 ms 💿 VBW 100 kHz Mode Sweep 1Pk View M1[1] 5.35 dBm 2.40216180 GHz M1 M2[1] -14.78 dBm 2.40152900 GHz 10 dBm 0 dBm Man -10 dBm Liz D1 -14.653 dBm -20 dBm -30 dBm M -4U dBm--50/dBm -60 dBm· -70 dBm· 1001 pts CF 2.402 GHz Span 3.0 MHz Marker Type | Ref | Trc | X-value Y-value Function Function Result 2.4021618 GHz 2.401529 GHz 5.35 dBm -14.78 dBm M1 M2 1 -14.77 dBm МЗ 2.402492 GHz 1 ----

Figure Channel 00:



Figure Channel 39:



Figure Channel 78:

1012 1.12		30	db SWI I	1 ms 🖷	VBW 100 kH	z Mo	de Sweep			
10 dBm-	ew				~~~	M N	M1[1] M2[1]		2.48	7.16 dBm 016180 GHz -12.88 dBm 952900 GH:
-10 dBm	0	1 -12.8	45 dBm	Mar	<i>x</i> '		may			
-20 dBm			A					1 mg		
-40 dBm		r	γ					V	m	
-St dBm	γ	/								f
-60 dBm	+									
-70 dBm	+									
CF 2.48	3 GHz				1001	pts			Spa	an 3.0 MHz
Marker Type	Ref	Tre	X-value	1	Y-value	1 6	unction	Eun	ction Resul	+
M1		1	2.4801618	GHz	7.16 dB	lm		T un	otton Robul	
M2 M3		1	2.479529	2 GHz	-12.88 dB	lm				



Product	:	Bike Navigation computer
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Mode 2: Transmit - 2Mbps

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1287		NA
39	2441	1284		NA
78	2480	1284		NA

Figure Channel 00:

Spectrun						E
Ref Leve	30.50 d	IBm Offset 10.50 dB	 RBW 30 kHz VBW 100 kHz 	Mode Sweep		
1Pk View	J	PAT 17.0	14-1			141001000
20 dBm				M1[1]		1.70 dBm 2.40200900 GHz -18.61 dBm 2.40136700 GHz
10 d8m			MI			
0 dBm			Anh	1		· · · · · · · · · · · · · · · · · · ·
-10 dBm				s mm	<u>\</u>	
-20 dBm	D1 -18.3	800 dBm		_	- MM3	
-30 dBm		1				
-40 dBm	mr					m
-50 dBm—						
-60 dBm					_	
CF 2.402 (GHz		1001 pt	s		Span 3.0 MHz
Marker						
Type Re	f Trc	X-value	Y-value	Function	Funct	ion Result
M1 M2	1	2.402009 GHZ 2.401367 GHz	-18.61 dBm			
M3	1	2.402654 GHz	-18.74 dBm			
)[Measuring	(Income)	25.09.2017

Date: 25.SEP.2017 06:03:29



Figure Channel 39:

Ref L	evel :	30.50 d 30	Bm Offset 10.50 dB dB SWT 1.1 ms	RBW 30 kHz VBW 100 kHz	Mode Sweep		
1Pk Vi	ew		PAR 110	1451 - 1456	NUCLEAR N		
20 dBm	_				M1[1]		2.47 dBn 2.44100900 GH: -17.97 dBn 2.44036700 GH:
10 d8m	-			MI			
0 dBm-	+			A	A	-	
-10 dBn			Mar		v mm	мз	
-20 dBn	0	1 -17.5	30 dBm			1	
-30 dBn	-						
≫40 dBA	~~~	-Ar	~~~				- martin
-50 dBn	-						
-60 dBn	-						
CF 2.4	41 GH	Iz		1001 pt	s		Span 3.0 MHz
Marker							
Туре	Ref	Trc	X-value	Y-value	Function	Funct	ion Result
M1		1	2.441009 GHz	2.4/ dBm			
M3		1	2.440507 GHz	-17.56 dBm			

Date: 25.SEP.2017 07:15:56

Figure Channel 78:

20 dBm					
20 dBm					
			M1[1] M2[1]		2.62 dB 2.48000900 G -18.10 dB 2.47936700 G
10 d8m		MI		-	1
0 dBm-		wh	1	_	
-10 dBm	Mar		- many	МЗ	
-20 dBm - D1 -17.3	81 dBm /			1	
-30 dBm	- /			<u> </u>	-
-40.dBm	and			<u> </u>	mon
-50 dBm					
-60 dBm					
CF 2.48 GHz		1001 pt:	5		Span 3.0 MH
1arker					
M1 4	2 490000 CHa	2.62 dbm	Function	Fur	iction Result
M2 1	2.479367 GHz	-18.10 dBm			
M3 1	2.480651 GHz	-17.56 dBm			

Date: 25.SEP.2017 08:16:18



Product	:	Bike Navigation computer
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Mode 3: Transmit - 3Mbps

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1296		NA
39	2441	1296		NA
78	2480	1290		NA

Figure Channel 00:

Spect	rum								
Ref L	evel	20.50 dBr 30 d	n Offset 0.50 d B SWT 1.1 n	18 - RBW 30 ki ns - VBW 100 ki	Hz Hz	Mode Sweep			
e 1Pk V	iew			10		101 MAR #			
10 dBm				0	h .	M1[1]	2	2.402	4.40 dBm 16180 GHz 16.39 dBm 35200 GHz
-10 dBm-	n		Ma	mm		how	мз		
-20 dBr		1 -15.602	dBm		F		1		
-30 dBr		m					m	m	m
-50 dBr	n+				\vdash				
-60 dBr	n				\vdash				
-70 dBr	n				+				
CF 2.4	02 GH	lz		100	1 pts	;		Spa	n 3.0 MHz
Marker									
Туре	Ref	Trc	X-value	Y-value		Function	Fun	ction Result	
M1		1	2.4021618 GH	lz 4.40 d	Bm				
M2 M3		1	2.401352 GH 2.402648 GH	iz -16.39 d iz -15.85 d	Bm Bm				
)				Measuring		4/4	3.06.2017



Figure Channel 39:

Spect	rum									
Ref L	evel	20.50 dB	m Offset	0.50 dB 🖷	RBW 30 ki	Hz	011000000000			
Att	ew.	30.0	6 SWI	1.1 ms 🖷	VBW 100 K	HZ	Mode Sweep			
10 dBm						~	M1[1]		2.44	5.43 dBm 116180 GHz -15.50 dBm 035200 GHz
-10 dBm		1 -14.57	4 dBm	~~			m	Mrs .		
-20 dBm	-	- 1919-9				+				
-30 dBm -40 dBm		m	m					~	mn	m
-50 dBm	+					\vdash				
-60 dBm						+				
-70 dBm	-					+				
CF 2.44	41 G⊦	lz			100	1 pts	5		Spa	an 3.0 MHz
Marker										
Type	Ref	Trc	X-valu	e	Y-value		Function	Fui	nction Resul	t
M1		1	2.44116	18 GHz	5.43 d	Bm				
M2 M3		1	2.4403	52 GHz	-15.50 d	Bm				
			2.1110		11.51 0		Measuring		144	03.06.2017

Figure Channel 78:

Ref L	evel	20,50 de 30	dm Offset 0.50 dB dB SWT 1.1 ms	 RBW 30 kHz VBW 100 kHz 	Mode Sweep		
10 dBm	ew			and	M1[1] M1_M2[1]		6.00 dBm 2.48016180 GH; -14.02 dBm 2.47935500 GH;
-10 dBn -20 dBn	0	1 -13.99	M2 ~~		mm	Ma	
-30 dBm -40 dBm	5	~~	ment			h	mm
-50 dBrr	-						
-60 dBm							
-70 dBm	+						
CF 2.4	B GHz			1001 pt	s		Span 3.0 MHz
larker							
Type	Ref	frc	X-value	Y-value	Function	Func	tion Result
M2		1	2.4601018 GHZ	-14.02 dpm			
MO		1	2.479355 GHZ	-14.02 dBm			



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.