

FCC Test Report

Product Name	: Heart-Rate Smartwatch
Trade Name	: Holux
Model No.	: Impulse8100
FCC ID.	: RJI-IMPULSE8100

Applicant : HOLUX TECHNOLOGY, INC

Address : No. 1-1, Innovation Road 1, Science-Based Industrial Park, Hsinchu 30076, Taiwan, R.O.C.

Date of Receipt	:	Jul. 10, 2015
Issued Date	:	Oct. 01, 2015
Report No.	:	1570314R-RFUSP01V00
Report Version	:	V1.0
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The test results relate only to the samples tested.

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Test Report Certification

Issued Date : Oct. 01, 2015 Report No. : 1570314R-RFUSP01V00

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Product Name	:	Heart-Rate Smartwatch
Applicant	:	HOLUX TECHNOLOGY, INC
Address	:	No. 1-1, Innovation Road 1, Science-Based Industrial Park,
		Hsinchu 30076, Taiwan, R.O.C.
Trade Name	:	Holux
Model No.	:	Impulse8100
FCC ID.	:	RJI-IMPULSE8100
EUT Voltage	:	Mode 1: DC 5V (Power by PC)
		Mode 2: DC 3.7V (Power by Battery)
Testing Voltage	:	Mode 1: DC 5V (Power by PC)
		Mode 2: DC 3.7V (Power by Battery)
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2014
		ANSI C63.10: 2013
Test Lab	:	QuieTek HsinChu Testing Lab
Test Result	:	Complied

The test results relate only to the samples tested.

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		(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1570314R-RFUSP01V00	Rev.1.0	Initial issue of report	Oct. 01, 2015



Laboratory Information

We, **QuieTek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	:	TAF, Accreditation Number: 3024
USA	:	FCC, Registration Number: 365520
Canada	:	IC, Submission No: 181665 / IC Registration Number: 4075C-4

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site:

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

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <u>http://www.quietek.com/index_en.aspx</u>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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1. General Information

1.1. EUT Description

Product Name	Heart-Rate Smartwatch
Trade Name	Holux
Model Name	Impulse8100
Frequency Range/Channel Number	2402~2480MHz / 40 Channels
Type of Modulation	BLE 4.0 (GFSK)

Antenna Information		
Antenna Type	Omni-directional Antenna	
Antenna Gain	Ant 0: Peak 1dBi	

Accessories Information	
USB Cable	Shielded, 1m









Working Frequency of Each Channel									
Channel Frequency Channel Frequency Channel Frequency Channel Frequ									
Channel 00	2402 MHz	Channel 10	2422 MHz	Channel 20	2442 MHz	Channel 30	2462 MHz		
Channel 01	2404 MHz	Channel 11	2424 MHz	Channel 21	2444 MHz	Channel 31	2464 MHz		
Channel 02	2406 MHz	Channel 12	2426 MHz	Channel 22	2446 MHz	Channel 32	2466 MHz		
Channel 03	2408 MHz	Channel 13	2428 MHz	Channel 23	2448 MHz	Channel 33	2468 MHz		
Channel 04	2410 MHz	Channel 14	2430 MHz	Channel 24	2450 MHz	Channel 34	2470 MHz		
Channel 05	2412 MHz	Channel 15	2432 MHz	Channel 25	2452 MHz	Channel 35	2472 MHz		
Channel 06	2414 MHz	Channel 16	2434 MHz	Channel 26	2454 MHz	Channel 36	2474 MHz		
Channel 07	2416MHz	Channel 17	2436 MHz	Channel 27	2456 MHz	Channel 37	2476 MHz		
Channel 08	2418 MHz	Channel 18	2438 MHz	Channel 28	2458 MHz	Channel 38	2478 MHz		
Channel 09	2420 MHz	Channel 19	2440 MHz	Channel 29	2460 MHz	Channel 39	2480 MHz		

- 1. This device is a Heart-Rate Smartwatch including BT 4.0 transmitting and receiving function.
- 2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.247.
- Regards to the frequency band operation; the lowest
 middle and highest frequency of
 channel were selected to perform the test, and then shown on this report.
- 4. This device is a composite device in accordance with Part 15 regulations. The function of the receiving was tested and its test report number is 1570314R-RFUSP01V00-A.

1.2. Test Mode

QuieTek has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

ту	Mode 1: Transmit-Power by PC
	Mode 2: Transmit-Power by Battery

Test Items	Modulation	Channel	Antenna	Result
Conducted Emission	GFSK	00/19/39	0	Complies
Peak Power Output	GFSK	00/19/39	0	Complies
Radiated Emission	GFSK	00/19/39	0	Complies
RF antenna conducted test	GFSK	00/19/39	0	Complies
Radiated Emission Band Edge	GFSK	00/19/39	0	Complies
Occupied Bandwidth	GFSK	00/19/39	0	Complies
Power Density	GFSK	00/19/39	0	Complies



1.3. Tested System Details

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

Test Mode		Mode 1: Transmit-Power by PC					
Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord	
1 Notebook PC		ASUS	X522EP	E5N0CV043264 197	DoC	Non-Shielded, 1.8m, one ferrite core bonded	
2	Notebook PC	HP	HSTNN-146C	CNU8253S1X	DoC	Non-Shielded, 1.8m	
3	USB Mouse	Logitech	M-UV83	LZE35006065	DoC		
4	Microphone &	Fujiei	SBZ-38	N/A	DoC		
	Earphone						

Test Mode		Mode 2: Transmit-Power by Battery					
Product		Manufacturer Model No. S		Serial No. FCC		Power Cord	
1	Notebook PC	ASUS	X522EP	E5N0CV043264 197	DoC	Non-Shielded, 1.8m, one ferrite core bonded	



1.4. Configuration of tested System





Test M	ode	Mode 2: Transmit-Power by B	attery					
	Connection Diagram							
Noteb	pook PC (1)	A						
	Się	gnal Cable Type	Signal cable Description					
А	Signal Cal	ble	Non-Shielded, 3m					

1.5. EUT Exercise Software

1	Test system is in accord with EUT user manual (refer to 1.4 configuration of tested
	system).
2	Turn on the power of all equipment.
3	Execute the notebook PC's test program "nRFgo studio" and then link with the EUT.
4	Configure the test mode, the test channel, and the data rate.
5	Press "Start TX" to start the continuous transmitting.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.207	25 - 75	50 %RH
Barometric pressure (mbar)	Conducted Emission	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	Peak Power Output	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	Radiated Emission	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	RF antenna conducted test	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	Band Edge	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	Occupied Bandwidth	860 - 1060	950-1000
Temperature (°C)		15 - 35	23 °C
Humidity (%RH)	FCC PART 15 C 15.247	25 - 75	50 %RH
Barometric pressure (mbar)	Power Density	860 - 1060	950-1000



2. Conducted Emission

2.1. Test Equipment

The following test equipments are used during the test:

Conducted Emission / SR2

Instrument	Manufacturer	Model No.	Serial No.	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2016/01/25
LISN	R&S	ENV216	100092	2016/08/17
Test Receiver	R&S	ESCS 30	825442/014	2016/07/16

Note: All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpa	FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)						
Frequency 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.

2.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2014

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

Site : SR2	Time : 2015/09/22 - 11:40
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-5_0818 - Line1	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_ GFSK_2440MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV)	(dB)	(dBuV)	
1		0.197	9.688	37.830	47.518	-16.223	63.741	QUASIPEAK
2		0.197	9.688	26.650	36.338	-17.403	53.741	AVERAGE
3		0.259	9.692	28.710	38.403	-23.049	61.451	QUASIPEAK
4		0.259	9.692	17.730	27.423	-24.029	51.451	AVERAGE
5		0.326	9.699	29.880	39.579	-19.979	59.558	QUASIPEAK
6		0.326	9.699	19.450	29.149	-20.409	49.558	AVERAGE
7		1.216	9.733	20.680	30.413	-25.587	56.000	QUASIPEAK
8		1.216	9.733	9.020	18.753	-27.247	46.000	AVERAGE
9		5.541	9.935	18.750	28.685	-31.315	60.000	QUASIPEAK
10		5.541	9.935	7.360	17.295	-32.705	50.000	AVERAGE
11		24.002	10.444	24.700	35.144	-24.856	60.000	QUASIPEAK
12	*	24.002	10.444	23.770	34.214	-15.786	50.000	AVERAGE

Note:

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

2. " * ", means this data is the worst emission level.

3. Measurement Level = Reading Level + Correct Factor

Site : SR2	Time : 2015/09/22 - 11:43
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-5_0818 - Line2	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_ GFSK_2440MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV)	(dB)	(dBuV)	
1		0.189	9.765	36.530	46.295	-17.782	64.078	QUASIPEAK
2		0.189	9.765	22.700	32.465	-21.612	54.078	AVERAGE
3		0.267	9.774	29.700	39.473	-21.732	61.205	QUASIPEAK
4		0.267	9.774	19.740	29.513	-21.692	51.205	AVERAGE
5		0.412	9.787	23.770	33.558	-24.056	57.614	QUASIPEAK
6		0.412	9.787	11.100	20.888	-26.726	47.614	AVERAGE
7		0.482	9.798	20.590	30.389	-25.915	56.304	QUASIPEAK
8		0.482	9.798	6.940	16.739	-29.565	46.304	AVERAGE
9		4.263	9.956	20.710	30.667	-25.333	56.000	QUASIPEAK
10		4.263	9.956	9.750	19.707	-26.293	46.000	AVERAGE
11		24.002	10.250	24.890	35.140	-24.860	60.000	QUASIPEAK
12	*	24.002	10.250	23.910	34.160	-15.840	50.000	AVERAGE

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

- 2. " * ", means this data is the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Equipment

The following test equipments are used during the test:

Peak Power Output / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum	R&S	FSV40	101049	2015/10/30
Analyzer				
Signal Analyzer	R&S	FSV7	101650	2015/12/17

Note: All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Test procedures

The EUT was tested according to DTS test procedure section 9.1.2 of KDB558074 v03r02 measurement to FCC 47CFR 15.247 requirements.

3.4. Limits

The maximum peak power shall be less 1 Watt.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

3.6. Uncertainty

The measurement uncertainty is defined as \pm 1.27 dB.

3.7. Test Result

Product	Heart-Rate Smartwatch				
Test Item	Peak Power Output				
Test Mode	Mode 1: Transmit-Power by PC				
Date of Test	2015/09/22 Test Site SR7				

BLE 4.0 (GFSK)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	-1.20	30	Pass
19	2440	-0.14	30	Pass
39	2480	0.71	30	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipments are used during the test:

Radiated Emission / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	Schaffner	CBL6112B	2895	2016/08/14
Double Ridged Guide Horn Antenna	Schwarzbeck	BBHA 9120	D743	2016/01/26
Pre-Amplifier	EMCI	EMC0031835	980233	2016/01/18
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2016/01/18
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/01/07
k Type Cable	Huber+Suhner	SF 102	25623/2	2016/01/26
Horn Antenna	Schwarzbeck	BBHA 9170	203	2016/09/07
Signal & Spectrum Analyzer	R&S	FSV40	101049	2015/10/30

Note: All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup

Under 1GHz Test Setup:









4.3. 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	dDu\//m	dPu\//m		
MHz	dBuv/m	uduv/m		
30-88	100	40		
99.216	150	12 5		
00-210	150	43.3		
216-960	200	46		
Above 960	500	54		

Remark: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 213 and tested according to DTS test procedure of KDB558074 v03r02 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 and 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

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: 213 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

4.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

4.6. Uncertainty

The measurement uncertainty $30MHz \sim 1GHz$ as $\pm 3.43dB$ $1GHz \sim 26.5Ghz$ as $\pm 3.65dB$



4.7. Test Result

30MHz-1GHz Spurious

Site : CB1	Time : 2015/09/21 - 13:23
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2440MHz



- 1. All Reading Levels are Quasi-Peak value.
- 2. "*", means this data is the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor



Site : CB1	Time : 2015/09/21 - 13:27
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2440MHz



- 1. All Reading Levels are Quasi-Peak value.
- 2. "*", means this data is the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2015/09/21 - 13:31
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - HORIZONTAL	Power : DC 3.7V
EUT : Heart-Rate Smartwatch	Note : Mode 2: Transmit-Power by Battery _
	GFSK_2440MHz



		Trequency	CONTECT ACTOR	Reading Level	INICASULE LEVEL	iviai yiri	LIIIII	Delector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1	*	32.909	13.128	12.856	25.984	-14.016	40.000	QUASIPEAK
2		372.724	14.499	13.697	28.196	-17.804	46.000	QUASIPEAK
3		543.358	17.313	6.862	24.175	-21.825	46.000	QUASIPEAK
4		676.667	17.873	10.985	28.859	-17.141	46.000	QUASIPEAK
5		824.033	19.276	7.690	26.966	-19.034	46.000	QUASIPEAK
6		977.701	20.106	6.200	26.307	-27.693	54.000	QUASIPEAK

- 1. All Reading Levels are Quasi-Peak value.
- 2. "*", means this data is the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2015/09/21 - 13:35
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB1_FCC_EFS_30-1G-2_1011 - VERTICAL	Power : DC 3.7V
EUT : Heart-Rate Smartwatch	Note : Mode 2: Transmit-Power by Battery _
	GFSK_2440MHz



1	*	32.909	13.128	15.970	29.098	-10.902	40.000	QUASIPEAK
2		601.044	17.489	8.025	25.514	-20.486	46.000	QUASIPEAK
3		668.911	17.834	9.999	27.833	-18.167	46.000	QUASIPEAK
4		752.289	18.632	7.742	26.373	-19.627	46.000	QUASIPEAK
5		857.966	19.364	6.954	26.318	-19.682	46.000	QUASIPEAK
6		955.402	19.925	6.538	26.463	-19.537	46.000	QUASIPEAK

- 1. All Reading Levels are Quasi-Peak value.
- 2. "*", means this data is the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor



Above 1GHz Spurious

Site : CB1	Time : 2015/09/21 - 19:00
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2015/09/21 - 19:08
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2015/09/21 - 19:16
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2440MHz



- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2015/09/21 - 19:24
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2440MHz



- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2015/09/21 - 19:32
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



4

12403.280

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.

40.860

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.

8.320

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

49.179

-24.821

74.000

PEAK

7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB1	Time : 2015/09/21 - 19:40
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



4

12398.581

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.

41.360

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. "*", means this data is the worst emission level.

8.319

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

49.680

-24.320

74.000

PEAK

7. The Emission above 13GHz were not included is because their levels are too low.



5. **RF** antenna conducted test

5.1. Test Equipment

The following test equipments are used during the test:

RF antenna conducted test / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum	R&S	FSV40	101049	2015/10/30
Analyzer				
Signal Analyzer	R&S	FSV7	101650	2015/12/17

Note: All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup

RF Antenna Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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 an RF conducted or radiated measurement. 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)).

5.4. Test Procedure

The EUT was setup according to ANSI C63.10: 213 and tested according to DTS test procedure section 11.2 of KDB558074 v03r02 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

5.6. Uncertainty

Conducted is defined as ± 1.27dB

5.7. Test Result

Product	Heart-Rate Smartwatch		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit-Power by PC		
Date of Test	2015/09/22	Test Site	SR7

BLE 4.0 (GFSK)							
Channel	Frequency	Measure Level	Limit	Pocult			
Channel	(MHz)	(dBc)	(dBc)	Result			
00	2402	43.765	≧20	Pass			
19	2440	44.114	≧20	Pass			
39	2480	42.263	≧20	Pass			

🗊 Agilent Spectrum Analyzer - Swept SA	
XX 50 Ω AC SENSE:INT ALIGN AUTO 02:09:25 PM Sep 22, 2015 Center Freq 2.400000000 GHz Avg Type: Log-Pwr TRACE 1 2 3 4 5 6 Tria: Free Run Avg Hold > 100/100 Type Mutational	Frequency
Input: RF PN0: Fast Fig. Free Rdn Avgnitid 100 dB DET PNNNN IFGain:Low #Atten: 30 dB Ext Gain: -1.00 dB ΔMkr2 14.24 MHz 43.765 dB	Auto Tune
	Center Freq 2.40000000 GHz
-20.0 -30.0 -40.0	Start Freq 2.35000000 GHz
	Stop Freq 2.45000000 GHz
Center 2.40000 GHZ Span 100.0 MHZ #Res BW 100 kHz #VBW 300 kHz Sweep 10.0 ms (10001 pts)	CF Step 10.000000 MHz
1 N 1 f 2.402 02 GHz 1.709 dBm 2 Δ3 1 f (Δ) 14.24 MHz (Δ) 43.765 dB 3 F 1 f 2.387 78 GHz -42.056 dBm	Freq Offset 0 Hz



DAgilent Spectrum Analyzer - Swept SA	
χμ 50 Ω AC SENSE:INT ALIGNAUTO 02:13:45 PM Sep 22, 2015 Center Freq 2.437000000 GHz Avg Type: Log-Pwr TRACE 1 2 3 4 5 1 Trig: Free Pup Avg Type: Log-Pwr TRACE 1 2 3 4 5 1	Frequency
Input: RF PN0: Fast Ing. File Huginoid 100 dB Det P NNNT IFGain:Low #Atten: 30 dB Ext Gain: -1.00 dB Det P NNNT ΔMkr4 -46.34 MHz 55.811 dE	Auto Tune
Log 10.0 0.00 -10.0	Center Freq 2.437000000 GHz
	Start Freq 2.387000000 GHz
-50.0	Stop Freq 2.487000000 GHz
Center 2.43700 GHz Span 100.0 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10.0 ms (10001 pts MKR Mode TRC SCL X Y FUNCTION FUNCTION width FUNCTION value 1 N 1 f 2.440 02 GHz 2.174 dBm Image: Content of the second	CF Step 10.000000 MHz <u>Auto</u> Man
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Freq Offset 0 Hz
8 9 10 11 11 12 11	



D Ag	gilent S	Spect	rum	Analyze	r - Sw	vept S	A														
₩ Cei	nter	Fre	50 £ q	2.483	350	000	0 GI	Hz			Si n: Fre	ENSE:		Av	g Type	ALIGN AUT : Log-Pw :> 100/100	to Vr	02:11:27 P TRAC	M Sep 22, 2 E 1 2 3 4 E M MANA	56	Frequency
10 c	B/div	i	Ref	f 20.0	Inpu 0 dE	t: R⊦ 3m	IFG	iU: Fas Jain:Lo	st ∟ _∎ ∟)w	#At	ten: 3	0 dE	3	Ext	Gain:	-1.00 dB	MI	kr2 -33. 42	62 MH .263 d	N N IZ B	Auto Tune
10.0 0.00												Δ3 -									Center Freq 2.483500000 GHz
-20.0 -30.0 -40.0										-	/\ /\	h						×3	-17.30 c	18m	Start Freq 2.433500000 GHz
-50.0 -60.0 -70.0) 	Ale nord	4177 4 14		144.ml		للفادين ويل	•∕		¥.		WW	*****	in, i mi ula	ninetrat		-	h Maralan Hater Agest		h, e ciu	Stop Freq 2.533500000 GHz
Cer #Re MKR	nter : es Bl MODE N	2.48 W 1	835 00	0 GHz kHz	z	× 2.4	4 <u>80 0</u>	#\ 1 GH;	VBW	300	kHz 202 c	z IBm	FUN	CTION	FU	Sweep	1(2001	Span 1 0.0 ms (1 FUNCTIO	00.0 M 0001 p IN VALUE	Hz ts)	CF Step 10.000000 MHz <u>Auto</u> Man
2 3 4 5 6 7 8	Δ3 F	1	f	<u>(Δ)</u>		2.5	- <u>33.62</u> 513.63	2 MH2 3 GH2		4: -40.0	2.263 061 d	Bm									Freq Offset 0 Hz
9 10 11 12 MSG																STA	TUS				



Product	leart-Rate Smartwatch					
Test Item	RF antenna conducted test					
Test Mode	ode Mode 1: Transmit-Power by PC					
Date of Test	2015/09/22 Test Site SR7					

Channel 00 (30MHz-25GHz)- BLE 4.0 (GFSK)

🚺 Agilent Spectrum Analyzer - Sw	rept SA				
2 50 Ω Center Freq 12.51500	AC S		ALIGNAUTO Type: Log-Pwr	02:24:46 PM Sep 22, 2015 TRACE 1 2 3 4 5 6 TYPE M MANAGAMAN	Frequency
10 dB/div Ref 20.00 dE	t: RF PN0: Fast L The	30 dB Ext	Gain: -1.00 dB Mkr:	2 24.855 8 GHz -42.959 dBm	Auto Tune
10.0					Center Freq 12.515000000 GHz
-10.0					Start Free 30.000000 MH:
-20.0				-18.29 dBm	Stop Fred 25.000000000 GH:
-40.0			- 16-00-10-10-10-10-10-10-10-10-10-10-10-10-	2	CF Step 2.497000000 GH <u>Auto</u> Ma
-60.0					Freq Offse 0 H
-70.0 Center 12.52 GHz #Res BW 100 kHz	#VBW 300 kH;	2	Sweep	Span 24.97 GHz 2.39 s (40001 pts)	
ISG		45-	STATUS	- (1

Channel 19 (30MHz-25GHz)- BLE 4.0 (GFSK)

	gilent Spect	trum Analy	zer - Swept SA	l.							
LXI		50 Ω			AC SE	NSE:INT		ALIGNAUTO	02:15:40 F	M Sep 22, 2015	Frequency
Sta	art Freq	30.00	Input: RF	Z PNO: Fast 😱 IFGain:Low	Trig: Free #Atten: 30	eRun)dB	Avg Type Avg Hold Ext Gain:	e: Log-Pwr :>10/10 -1.00 dB	TY	ET P N N N N N	. requeries
10 c	dB/div	Ref 20.	00 dBm					ΔMkr	2 22.06 -44	7 9 GHz .489 dB	Auto Tune
101											Center Freq
0.0		∮ ¹									12.51500000 GHz
-10.0											Start Fred 30.000000 MHz
-20.0		_								-17.83 dBm	
-30.0	0										25.000000000 GHz
-40.0	o									24	CF Step
-50.0	0		الأفاط مؤتر وال				ار المراجع المراجع		and the second second		2.497000000 GH2 <u>Auto</u> Mar
-60.0	Generalitation Departments				and the state of t		a linen en se si	a na ang ang ang ang ang ang ang ang ang			Freq Offset
-70.0	0										0 Hz
Sta #Re	es BW 1	Hz 100 kHz		#VBW	300 kHz			Sweep	Stop 2 2.39 s (4	5.00 GHz 0001 pts)	
MSG								STATUS			



D Agilent Spectrum Analyzer - Swept SA AC SENSE:INT ALIGNAUTO D2:25:57PM Sep:22,2015 Frequency Center Freq 12.515000000 GHz Input: RF PN0: Fast C Trig: Free Run Avg Type: Log-Pwr TYPE MWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW				v v	,			
M 50 R AC SENSE:INT ALIGNAUTO D2:25:57PM Sep 22, 2015 Frequency Center Freq 12.515000000 GHz Trig: Free Run Avg Holds/s10/10 Tract 1 2 3 4 5 6 Frequency Imput: RF PN0: Fast Trig: Free Run Avg Holds/s10/10 Auto T 10 dB/div Ref 20.00 dBm Trig: Free Run Mkr2 24.823 3 GHz -43.121 dBm Auto T 10.0 1 Imput: RF Imput: RF Imput: RF Imput: RF Ref 20.00 dBm Imput: RF Ref 20.00 dBm Imput: RF Imput: RF Ref 20.00 dBm Imput: RF Ref 20.	🔎 Agilent Spectrum	Analyzer - Swept SA						
Mkr2 24.823 3 GHz Auto T 10 dB/div Ref 20.00 dBm -43.121 dBm 10.0 1 1 1 10.0 1 1 1 10.0 1 1 1 10.0 1 1 1 10.0 1 1 1 10.0 1 1 1 1 10.0 1 1 1 1 1 10.0 1 1 1 1 1 1 10.0 1 1 1 1 1 1 1 10.0 1	Center Freq	Ω 12.51500000 Input: RF	AC SE O GHz PNO: Fast IEGain: aw #Atten: 31	NSE:INT e Run D dB	Avg Type Avg Hold: Ext Gain:	ALIGN AUTO : Log-Pwr • 10/10 • 1 00 dB	02:25:57 PM Sep 22, 2015 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	Frequency
10.0 1 Center I 10.0 1 1 1 12.51500000 0.00 1 1 12.51500000 12.51500000 10.0 1 1 1 13.00000 12.515000000 10.0 1 1 1 13.00000 12.515000000 10.0 1 1 1 13.000000 12.515000000 20.0 1 1 1 1 13.000000 10.00000 20.0 1 1 1 1 10.00000 10.00000 10.000000 30.0 1 1 1 1 10.00000 10.000000 10.000000 40.0 1 1 1 1 1 1 10.00000000 10.00000000000000000000000000000000000	10 dB/div Re	f 20.00 dBm	in Gam. Low			Mkr	2 24.823 3 GHz -43.121 dBm	Auto Tune
10.0 1 12.515000000 000 1 12.515000000 10.0 1 12.515000000 10.0 1 12.515000000 10.0 1 12.515000000 10.0 1 12.515000000 10.0 1 12.515000000 10.0 1.17.30 dBm 12.5150000000 20.0 1.17.30 dBm 1.17.30 dBm 30.0 1.17.30 dBm 1.17.30 dBm 30.0 1.17.30 dBm 1.17.30 dBm 40.0 1.17.30 dBm 1.17.30 dBm								Center Freq
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0.00 V Image: Constraint of the second seco		1						
-10.0	0.00							Start From
-20.0 -20.0 -30.0 -40.0 -5	10.0							30 000000 MHz
-20.0 -30.0 -40.0 -5	-10.0							00.000000 Mil 12
30.0 Stop F -30.0	-20.0						-17.30 dBm	
-30.0 -40.0 -5								Stop Freq
-40.0 -50.0	-30.0							25.000000000 GHz
-40.0 CF \$ 2.49700000 -50.0 CF \$ 2.49700000								
	-40.0							2 49700000 GH7
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								0 Hz
-70.0	-70.0							
Center 12 52 GHz Span 24 97 GHz	Center 12 52	GH7					Snan 24 97 GHz	
#Res BW 100 kHz #VBW 300 kHz Sweep 2.39 s (40001 pts)	#Res BW 100	kHz	#VBW 300 kHz			Sweep	2.39 s (40001 pts)	
MSG JAligning 1 of 3 STATUS	мsg 🔱 Aligning 1	of 3				STATUS	3	

Channel 39 (30MHz-25GHz)- BLE 4.0 (GFSK)



6. Radiated Emission Band Edge

6.1. Test Equipment

The following test equipments are used during the test:

Radiated Emission Band Edge / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Double Ridged Guide Horn	Schwarzbeck	BBHA 9120	D743	2016/01/26
Antenna				
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/01/07
k Type Cable	Huber+Suhner	SF 102	25623/2	2016/01/26
Signal & Spectrum Analyzer	R&S	FSV40	101049	2015/10/30

Note: All equipments that need to calibrate are with calibration period of 1 year.

6.2. Test Setup



6.3. 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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 213 and tested according to DTS test procedure of KDB558074 v03r02 for compliance to FCC 47CFR 15.247 requirements. The EUT and its simulators are placed on a turn table which is 1.5 meter above ground. The turn table can rotate 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: 213 on radiated measurement.

6.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

6.6. Uncertainty

The measurement uncertainty ± 3.9 dB above 1GHz

6.7. Test Result

Radiated is defined as

Site : CB1	Time : 2015/09/18 - 14:30
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 – 14:32
Limit : FCC_SpartC_15.247_H_03M_AV	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	28.366	14.075	42.441	-11.559	54.000	AVERAGE
2		2389.758	28.709	13.686	42.394	-11.606	54.000	AVERAGE
3		2390.000	28.709	13.694	42.403	-11.597	54.000	AVERAGE
4	*	2401.951	28.760	48.429	77.189	23.189	54.000	AVERAGE
5		2483.500	29.110	14.354	43.464	-10.536	54.000	AVERAGE
6		2483.910	29.112	14.400	43.512	-10.488	54.000	AVERAGE
7		2500.000	29.183	14.374	43.556	-10.444	54.000	AVERAGE

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 14:40
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	29.201	25.868	55.070	-18.930	74.000	PEAK
2		2365.969	29.169	27.791	56.960	-17.040	74.000	PEAK
3		2390.000	29.155	25.700	54.856	-19.144	74.000	PEAK
4	*	2401.751	29.149	58.810	87.959	13.959	74.000	PEAK
5		2483.500	29.102	26.511	55.613	-18.387	74.000	PEAK
6		2492.306	29.097	27.951	57.048	-16.952	74.000	PEAK
7		2500.000	29.094	27.066	56.160	-17.840	74.000	PEAK

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 14:42
Limit : FCC_SpartC_15.247_H_03M_AV	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2402MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	29.201	14.054	43.256	-10.744	54.000	AVERAGE
2		2310.597	29.201	14.087	43.288	-10.712	54.000	AVERAGE
3		2390.000	29.155	13.685	42.841	-11.159	54.000	AVERAGE
4	*	2401.951	29.149	44.759	73.908	19.908	54.000	AVERAGE
5		2483.500	29.102	14.399	43.501	-10.499	54.000	AVERAGE
6		2499.503	29.093	14.386	43.480	-10.520	54.000	AVERAGE
7		2500.000	29.094	14.352	43.446	-10.554	54.000	AVERAGE

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 14:50
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	28.366	26.205	54.571	-19.429	74.000	PEAK
2		2333.885	28.469	28.027	56.495	-17.505	74.000	PEAK
3		2390.000	28.709	26.067	54.776	-19.224	74.000	PEAK
4	*	2479.713	29.094	61.061	90.155	16.155	74.000	PEAK
5		2483.500	29.110	30.233	59.343	-14.657	74.000	PEAK
6		2483.611	29.111	30.056	59.167	-14.833	74.000	PEAK
7		2500.000	29.183	26.876	56.058	-17.942	74.000	PEAK

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 14:55
Limit : FCC_SpartC_15.247_H_03M_AV	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - HORIZONTAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	28.366	14.059	42.425	-11.575	54.000	AVERAGE
2		2389.758	28.709	13.654	42.362	-11.638	54.000	AVERAGE
3		2390.000	28.709	13.664	42.373	-11.627	54.000	AVERAGE
4	*	2480.012	29.095	46.564	75.659	21.659	54.000	AVERAGE
5		2482.911	29.108	14.688	43.796	-10.204	54.000	AVERAGE
6		2483.500	29.110	14.567	43.677	-10.323	54.000	AVERAGE
7		2500.000	29.183	14.401	43.583	-10.417	54.000	AVERAGE

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 15:00
Limit : FCC_SpartC_15.247_H_03M_PK	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	29.201	25.309	54.511	-19.489	74.000	PEAK
2		2341.482	29.184	27.262	56.446	-17.554	74.000	PEAK
3		2390.000	29.155	25.287	54.443	-19.557	74.000	PEAK
4	*	2479.713	29.104	58.611	87.715	13.715	74.000	PEAK
5		2483.500	29.102	26.383	55.485	-18.515	74.000	PEAK
6		2487.109	29.099	27.922	57.022	-16.978	74.000	PEAK
7		2500.000	29.094	25.629	54.723	-19.277	74.000	PEAK

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : CB1	Time : 2015/09/18 - 15:05
Limit : FCC_SpartC_15.247_H_03M_AV	Margin : 6
Probe : CB1_FCC_EFS_1-18G_H2 - VERTICAL	Power : DC 5V
EUT : Heart-Rate Smartwatch	Note : Mode 1: Transmit-Power by PC_
	GFSK_2480MHz



		Frequency	Correct Factor	Reading Level	Measure Level	Margin	Limit	Detector Type
		(MHz)	(dB)	(dBuV)	(dBuV/m)	(dB)	(dBuV/m)	
1		2310.000	29.201	14.105	43.307	-10.693	54.000	AVERAGE
2		2310.597	29.201	14.094	43.295	-10.705	54.000	AVERAGE
3		2390.000	29.155	13.663	42.819	-11.181	54.000	AVERAGE
4	*	2480.012	29.104	44.168	73.272	19.272	54.000	AVERAGE
5		2483.500	29.102	14.461	43.563	-10.437	54.000	AVERAGE
6		2499.503	29.093	14.408	43.502	-10.498	54.000	AVERAGE
7		2500.000	29.094	14.396	43.490	-10.510	54.000	AVERAGE

- 1. All readings 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. "*", means this data is the worst emission level.
- 5. Measurement Level = Reading Level + Correct Factor.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.



7. Occupied Bandwidth

7.1. Test Equipment

The following test equipments are used during the test:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum	R&S	FSV40	101049	2015/10/30
Analyzer				
Signal Analyzer	R&S	FSV7	101650	2015/12/17

Note: All equipments that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Test Procedures

The EUT was setup according to ANSI C63.10; tested according to DTS test procedure of KDB558074 v03r02 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 1-5% of the OBW, Set the VBW \geq 3xRBW, Sweep Time=Auto.

7.4. Limits

The 6 dB bandwidth must be greater than 500 kHz.

7.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

7.6. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

7.7. Test Result

Product	Heart-Rate Smartwatch					
Test Item	Occupied Bandwidth					
Test Mode	Mode 1: Transmit-Power by PC					
Date of Test	2015/09/22	Test Site	SR7			

BLE 4.0 (GFSK)							
Channel No.	Frequency (MHz) Measure Level(MHz)		Limit (MHz)	Result			
00	2402	0.679	≧0.5	Pass			
19	2440	0.687	≧0.5	Pass			
39	2480	0.683	≧0.5	Pass			

🗊 Agilent 🤅	Spectrum Analyzer - Occur	pied BW				
Center	50 Ω Freq 2.4020000 Input: R	AC Center F #IFGain:Low #Atten:	SENSE:INT Freq: 2.402000000 GHz ree Run Avg Hol 30 dB Ext Gair	ALIGNAUTO R Ra d:>100/100 h: -1.00 dB Ra	01:57:03PM Sep 22, 2015 adio Std: None adio Device: BTS	Freq / Channel
10 dB/div Log 10	v Ref 20 dBm					Center Fred
0						2.402000000 GHz
-20 -30						
-40 -50	Vmar					
-60 -70						CF Step
Center #Res B	2.402 GHz W 100 kHz	#\	/BW 300 kHz		Span 3 MHz Sweep 1 ms	300.000 kHz <u>Auto</u> Man
Occ	upied Bandwid 1	^{dth} I.0792 MHz	Total Power	8.38 d	Bm	
Tran x dB	smit Freq Error Bandwidth	25.973 kHz 679.4 kHz	OBW Power x dB	99.0 -6.00	0 % dB	
MSG				STATUS		



Channel 19

🗊 Agilent S	pectrum Analyzer - Occu	pied BW				
	50Ω Freg 2 440000		SENSE:INT Freg: 2.440000000 GHz	ALIGNAUTO 01:59:58 Radio Sto	PM Sep 22, 2015 1: None	Save
10 dB/div	Ref 20 dBn	RF Trig: I #IFGain:Low #Atten	Free Run Avg Holo n: 30 dB Ext Gain	d:>100/100 h: -1.00 dB Radio De	vice: BTS	State►
Log 10 -10 -20		N				Trace (+ State)
-30 -40 -50 -60						Data (Export) ► Trace 1
-70 Center #Res B\	2.44 GHz № 100 kHz	#	∜BW 300 kHz	Sr Sw	oan 3 MHz eep 1 ms	Screen Image
Оссі	upied Bandwi ,	^{dth} 1.1156 MHz	Total Power	9.00 dBm		
Tran: x dB	smit Freq Error Bandwidth	39.383 kHz 687.8 kHz	OBW Power x dB	99.00 % -6.00 dB		
MSG				STATUS		

🗊 Agiler	nt Spectrum	Analyzer	Occupied B	W							
(XI Cente	50 Pr Fred	Ω 2 4800	00000 0	SH7	AC SE Center F	NSE:INT reg: 2.48000	00000 GHz	ALIGN AUTO	02:00:54	PM Sep 22, 2015 I: None	Freq / Channel
Conte		1	nput: RF	EGain:Low	☐ Trig: Fre #Atten: 3	e Run 0 dB	Avg Hold Ext Gain	l:>100/100 : -1.00 dB	Radio De	vice: BTS	
	_			i Guill.2014						1	
10 dB/	10 dB/div Ref 20 dBm										
											Contor From
0											2.48000000 GHz
10					1		Mark Contraction of the second				
-10											
-20		~~~~~~~						have	· · · · · · · · · · · · · · · · · · ·		
-30											
-40											
-50 —											
-60											
-70 —											CF Step
Cente	er 2.48 0	GHz							Sp	an 3 MHz	300.000 kHz
#Res	BW 100) kHz			#VI	300 H	Hz		Sw	eep 1 ms	
Oc	cupied	Band	dwidth			Total P	ower	9.25	ō dBm		
1 3101 MHz											
-						0.014/ 5		~	0.00 %		
Transmit Freq Error 26.922 KHz		OBW Power 9		99	99.00 %						
xd	B Band	width		683.2	kHz	x dB		-6.	00 dB		
MSG								STATUS			



8. Power Density

8.1. Test Equipment

The following test equipment is used during the test:

Power Density / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Signal & Spectrum	R&S	FSV40	101049	2015/10/30
Analyzer				
Signal Analyzer	R&S	FSV7	101650	2015/12/17

Note: All equipments that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

8.4. Test Procedures

The EUT was setup according to ANSI C63.10: 213; tested according to DTS test procedure section 10.2 of KDB558074 v03r02 for compliance to FCC 47CFR 15.247 requirements. Set $3KHz \leq RBW \leq 100 \text{ kHz}$, Set $VBW \geq 3xRBW$, Sweep time=Auto, Set Peak detector; The tested according to section E)c) of KDB662911 v02v01.

8.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2014

8.6. Uncertainty

The measurement uncertainty is defined as ±1.27dB.

8.7. Test Result

Product	Heart-Rate Smartwatch		
Test Item	Power Density		
Test Mode	Mode 1: Transmit-Power by PC		
Date of Test	2015/09/22	Test Site	SR7

BLE 4.0 (GFSK)									
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result					
00	2402	-2.653	≦8	Pass					
19	2440	-3.908	≦8	Pass					
39	2480	-5.102	≦8	Pass					

D Ag	ilent Spectrum	Analyzer -	Swept SA			1.0					
₩ Cen	ter Freq	Ω 2.4020	00000 G	Hz	C SE	NSE:INT	Avg Typ	ALIGNAUTO E: Log-Pwr	01:58:25F	M Sep 22, 2015 CE 1 2 3 4 5 6	Frequency
10 d	Input: RF PN0: Far Trig: Free Run Avg Hold:>100/100 Trig: Free Run									Auto Tune	
10.0						. 1					Center Freq 2.402000000 GHz
0.00 -10.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~y~v	- And a start of the start of t	Y				Start Freq 2.400500000 GHz
-20.0 -30.0							- Way	m n			Stop Freq 2.403500000 GHz
-40.0 -50.0		N ANN	ww					Jurr		La	CF Step 300.000 kHz <u>Auto</u> Man
-60.0	L									V TUNKN	Freq Offset 0 Hz
-70.0 Cen	ter 2 4020	100 GHz							Span 3	3.000 MHz	
#Re	s BW 10	Hz		#VBW	30 kHz			Sweep	28.7 ms	(1001 pts)	
MSG								STATU	JS		



🚺 Agilent Spectrum Analyzer - Sw	vept SA	an as			
X 50Ω Contor Erog 2 44000		C SENSE:INT		0 01:59:35 PM Sep 22, 2015	Frequency
Center Freq 2.44000	t: RF PNO: Far G IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold:>100/100 Ext Gain: -1.00 dB		Auto Tune
10 dB/div Ref 20.00 dE	3m		MKI	-3.908 dBm	
					Center Free
10.0					2.440000000 GH
		1			
0.00					Start Free
10.0		Land Mary Mary	~		2.438500000 GH
			and the second		
-20.0	J ^r r		- my		Stop Free
30.0	hor		un un		2.441500000 GH
	1		h		
40.0	~~~ ~				CF Step
n m	w.r			- Junton	Auto Mar
				and the state of t	
60.0					Freq Offse
					0 H
-70.0					
Center 2.440000 GHz	#\/R\M	30 kHz	Sweet	Span 3.000 MHz	
	#*00*	50 MHZ	SWEEL		
			514		

Channel 19

