

FCC Test Report

Product Name	Automatic Upper Arm Blood Pressure Monitor
Model No.	HL858CE
FCC ID.	2ABTAHNL85CE

Applicant	Health & Life CO., LTD.
Address	9F., No.186, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan

Date of Receipt	Apr. 16, 2018
Issued Date	Apr. 30, 2018
Report No.	1840148R-RFUSP01V00
Report Version	V1.0



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

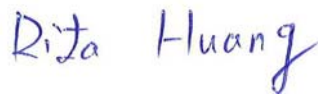
Issued Date: Apr. 30, 2018

Report No.: 1840148R-RFUSP01V00



Product Name	Automatic Upper Arm Blood Pressure Monitor
Applicant	Health & Life CO., LTD.
Address	9F., No.186, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan
Manufacturer	Health & Life CO., LTD.
Address	9F., No.186, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan
Name and address of factory (ies) :	#1 Health & Life (Suzhou) Co., Ltd. No.1428 Xiang Jiang Road, Suzhou New District, Suzhou City 215129, Jiangsu Province, China #2 LIVING SCIENCE CO., LTD. No.1428 Xiang Jiang Road, Suzhou New District Suzhou City 215129, Jiangsu Province, China
Model No.	HL858CE
FCC ID.	2ABTAHNL85CE
EUT Rated Voltage	AC 100-240V, 47-63Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	Health & Life
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Rita Huang)

Tested By :



(Engineer / Anson Lu)

Approved By :



(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Automatic Upper Arm Blood Pressure Monitor
Trade Name	Health & Life
Model No.	HL858CE
FCC ID.	2ABTAHNL85CE
Frequency Range	2402 – 2480MHz
Channel Number	V4.0: 40CH
Type of Modulation	V4.0: GFSK(1Mbps)
Antenna Type	PCB Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: SINPRO, M/N: HPU15-102 Input: AC 100-240V, 47-63Hz, 0.4-0.2A Output: 5.99V $\overline{=}$ 2A Cable in: Non-Shielded, 1.3m, with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	LaBest Technology Inc.	LB-BLE-005	PCB Antenna	2.23dBi for 2.4 GHz

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

Center Frequency of Each Channel: (For V4.0)

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

Note:

1. The EUT is a Automatic Upper Arm Blood Pressure Monitor with a built-in Bluetooth V4.0 transceiver, this report for Bluetooth V4.0.
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 - BLE (GFSK)
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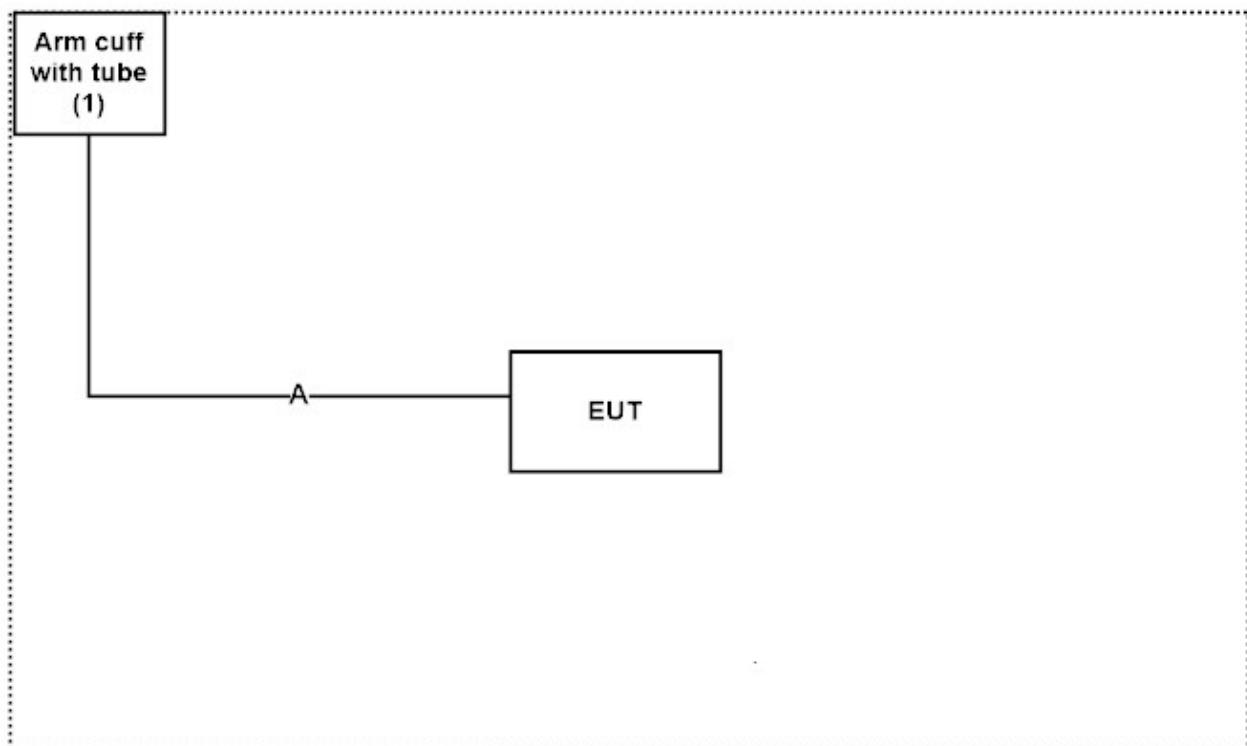
1.3. Tested System Details

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

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Arm cuff with tube	Health & Life CO., LTD.	N/A	N/A	N/A

	Signal Cable Type	Signal cable Description
A	Tube	Non-Shielded, 0.3m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute continue transmitter on the EUT
3. Check the test mode, the test channel, and the data rate.
4. 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	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

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

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,
Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2018/2/12	2019/2/11
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2017/10/13	2018/10/12
X	Power Meter	Anritsu	ML2495A	6K00003357	2017/8/7	2018/8/6
X	Pulse power sensor	Anritsu	MA2411B	0846193	2017/8/7	2018/8/6
X	EMI Test Receiver	R&S	ESCS 30	100369	2017/11/7	2018/11/6
X	LISN	R&S	ESH3-Z5	836679/017	2018/2/9	2019/2/8
X	LISN	R&S	ENV216	100097	2018/2/9	2019/2/8
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2017/6/22	2018/6/21

For Radiated measurements /Site3/CB8

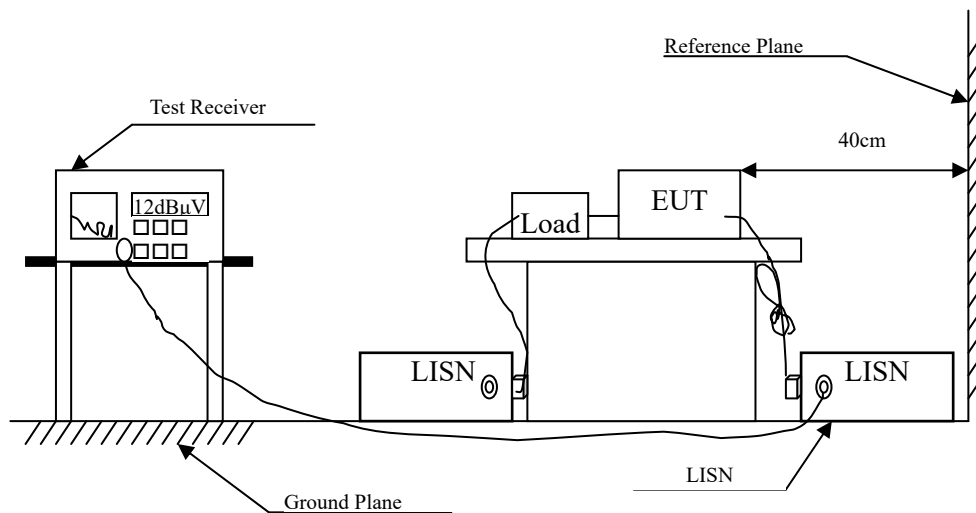
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2018/3/12	2019/3/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2018/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2017/06/25	2018/06/24
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2017/06/15	2018/06/14
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	170101000330	2017/07/19	2018/07/18
X	Coaxial Cable	QuieTek	SF-106	LC035/37/41-	2017/6/21	2018/6/20
X	Horn Antenna	ETS-Lindgren	3117	00135205	2018/04/28	2019/04/27
X	Pre-Amplifier	EMCI	EMC012630SE	980210	2018/02/23	2019/02/22
X	Amplifier + Cable	EMCI	EMC184045SE	980370	2018/03/21	2019/03/20
X	Horn Antenna	Com-Power	AH-840	101043	2018/01/09	2019/01/08
X	Filter	MicroTRON	BRM50701	019	2017/11/21	2018/11/20
	Filter	Microwave Circuits	N0257881	36681	2018/1/22	2019/1/21

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

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBμV) Limit		
Frequency MHz	Limits	
	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 investigated 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 DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V	Margin dB	Limit dB μ V
LINE 1					
Quasi-Peak					
0.158	9.679	33.280	42.960	-22.811	65.771
0.529	9.693	29.600	39.293	-16.707	56.000
0.556	9.695	38.120	47.815	-8.185	56.000
0.963	9.731	26.140	35.871	-20.129	56.000
1.857	9.788	23.980	33.768	-22.232	56.000
3.517	9.860	23.360	33.219	-22.781	56.000
Average					
0.158	9.679	12.330	22.010	-33.761	55.771
0.529	9.693	13.300	22.993	-23.007	46.000
0.556	9.695	21.060	30.755	-15.245	46.000
0.963	9.731	8.360	18.091	-27.909	46.000
1.857	9.788	6.390	16.178	-29.822	46.000
3.517	9.860	6.640	16.499	-29.501	46.000

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 : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

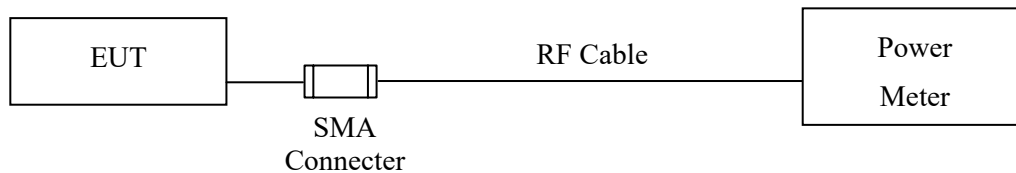
Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V	dB	dB μ V
LINE 2					
Quasi-Peak					
0.220	9.673	28.160	37.833	-26.167	64.000
0.357	9.672	27.480	37.152	-22.934	60.086
0.447	9.678	28.380	38.058	-19.456	57.514
0.541	9.684	34.580	44.264	-11.736	56.000
0.591	9.687	29.420	39.107	-16.893	56.000
1.033	9.725	27.060	36.785	-19.215	56.000
Average					
0.220	9.673	8.830	18.503	-35.497	54.000
0.357	9.672	9.680	19.352	-30.734	50.086
0.447	9.678	10.190	19.868	-27.646	47.514
0.541	9.684	17.050	26.734	-19.266	46.000
0.591	9.687	11.470	21.157	-24.843	46.000
1.033	9.725	8.950	18.675	-27.325	46.000

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

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

± 1.19 dB

3.5. Test Result of Peak Power Output

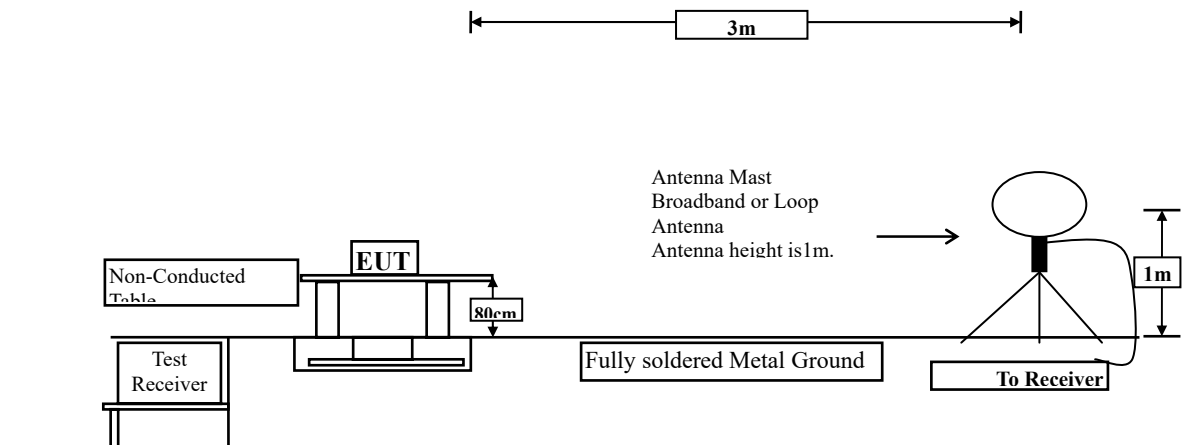
Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Peak Power Output
Test Site : No.3 OATS
Test date : 2018/04/17
Test Mode : Mode 1: Transmit - BLE (GFSK)

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	1.68	1 Watt= 30 dBm	Pass
Channel 19	2440.00	1.01	1 Watt= 30 dBm	Pass
Channel 39	2480.00	0.30	1 Watt= 30 dBm	Pass

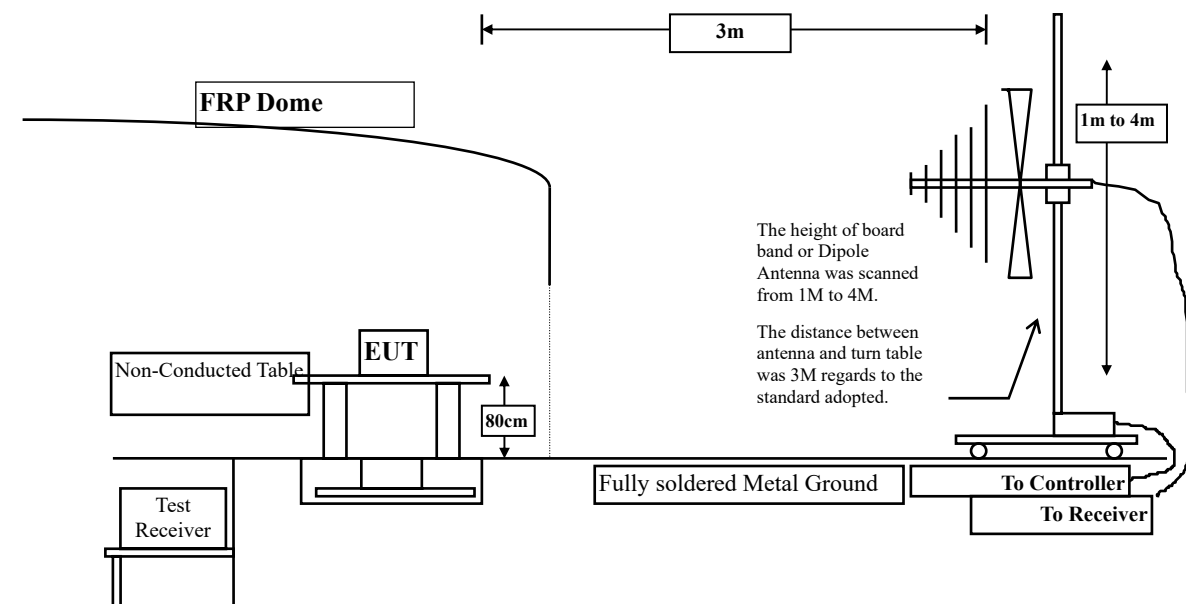
4. Radiated Emission

4.1. Test Setup

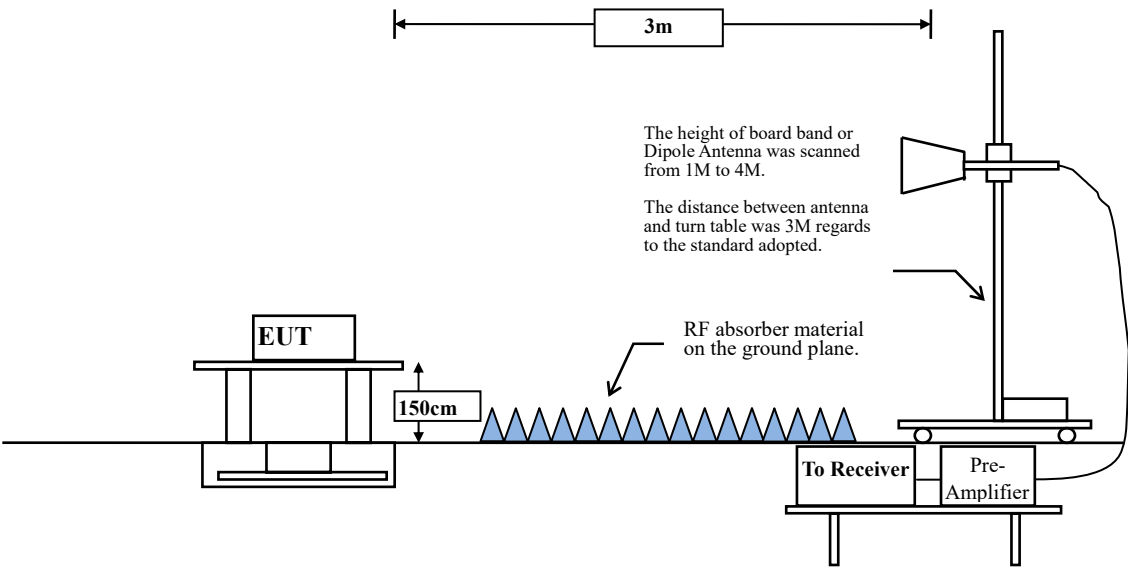
Under 30MHz



Below 1GHz



Above 1GHz



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 (microvolts/meter)	Measurement distance (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 (dB μ V) = 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 according to DTS test procedure of KDB558074 for 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 worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98 \%$

$VBW \geq 1/T$, when duty cycle $< 98 \%$

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	85.71	0.6	1667	2000

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

4.5. Test Result of Radiated Emission

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK)(2402MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
Horizontal					
Peak Detector:					
4804.000	2.511	42.303	44.813	-29.187	74.000
7206.000	9.511	34.581	44.092	-29.908	74.000
9608.000	10.394	34.251	44.645	-29.355	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4804.000	2.923	43.227	46.149	-27.851	74.000
7206.000	9.988	34.767	44.756	-29.244	74.000
9608.000	10.847	34.378	45.225	-28.775	74.000
Average Detector:					
--					

Note:

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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB μ V	dB μ V/m	dB	dB μ V/m
Horizontal					
Peak Detector:					
4880.000	2.038	39.679	41.717	-32.283	74.000
7320.000	9.699	34.961	44.660	-29.340	74.000
9760.000	9.665	33.752	43.417	-30.583	74.000
Average					
Detector:					
--					
Vertical					
Peak Detector:					
4880.000	2.499	41.736	44.235	-29.765	74.000
7320.000	10.303	36.858	47.161	-26.839	74.000
9760.000	10.299	35.699	45.999	-28.001	74.000
Average					
Detector:					
--					

Note:

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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV/m	Margin dB	Limit dBμV/m
Horizontal					
Peak Detector:					
4960.000	2.582	39.748	42.330	-31.670	74.000
7440.000	10.555	34.551	45.106	-28.894	74.000
9920.000	10.206	34.295	44.501	-29.499	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4960.000	3.398	40.936	44.335	-29.665	74.000
7440.000	11.214	35.427	46.641	-27.359	74.000
9920.000	11.245	35.213	46.458	-27.542	74.000
Average Detector:					
--					

Note:

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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

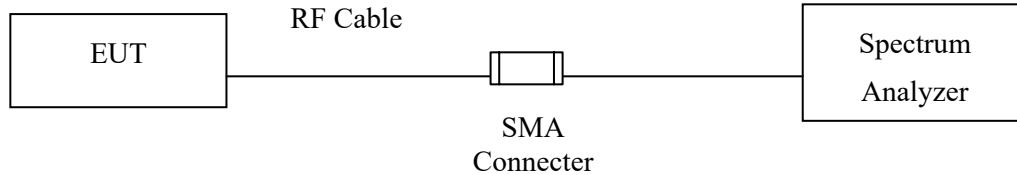
Frequency MHz	Correct Factor dB	Reading Level dB μ V	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m
Horizontal					
71.971	-8.098	39.017	30.919	-9.081	40.000
127.933	-10.061	37.506	27.445	-16.055	43.500
196.330	-9.858	49.716	39.859	-3.641	43.500
434.167	1.785	23.387	25.172	-20.828	46.000
707.756	6.062	22.649	28.712	-17.288	46.000
925.385	7.988	21.439	29.426	-16.574	46.000
Vertical					
134.151	-5.701	30.540	24.838	-18.662	43.500
224.311	-0.229	24.534	24.305	-21.695	46.000
418.622	0.805	22.322	23.127	-22.873	46.000
580.288	3.181	22.046	25.227	-20.773	46.000
737.292	4.883	21.138	26.020	-19.980	46.000
878.750	8.255	21.385	29.640	-16.360	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. 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 tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

$\pm 1.20\text{dB}$

5.5. Test Result of RF Antenna Conducted Test

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : RF Antenna Conducted Test
Test Site : No.3 OATS
Test date : 2018/04/17
Test Mode : Mode 1: Transmit - BLE (GFSK)

Figure Channel 00:

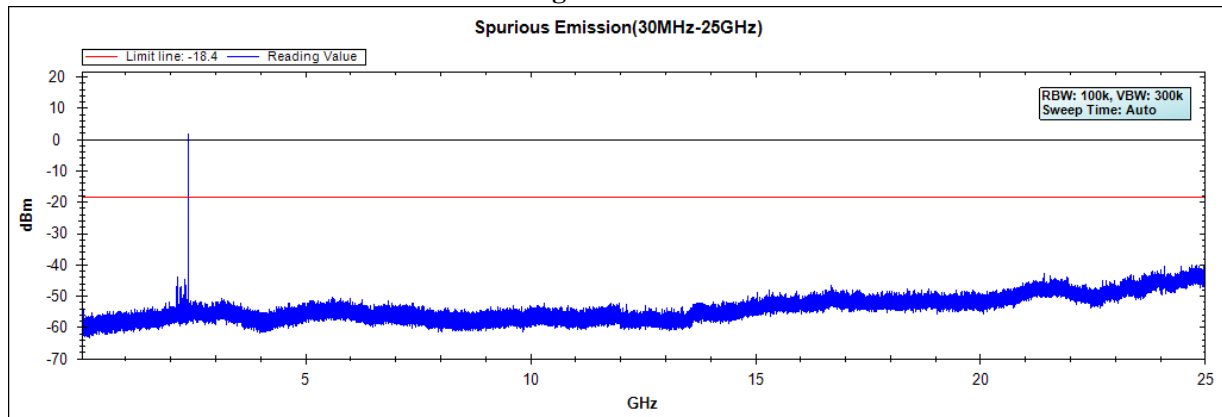


Figure Channel 19:

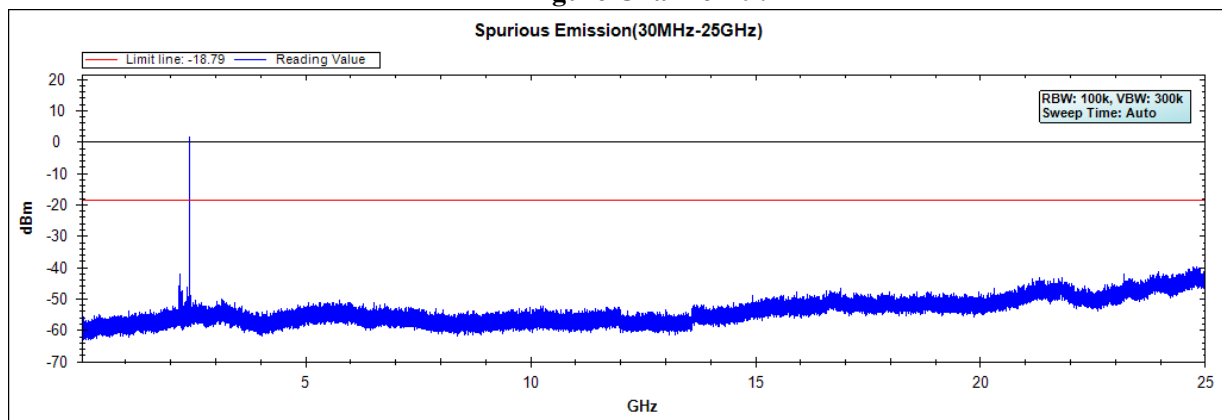
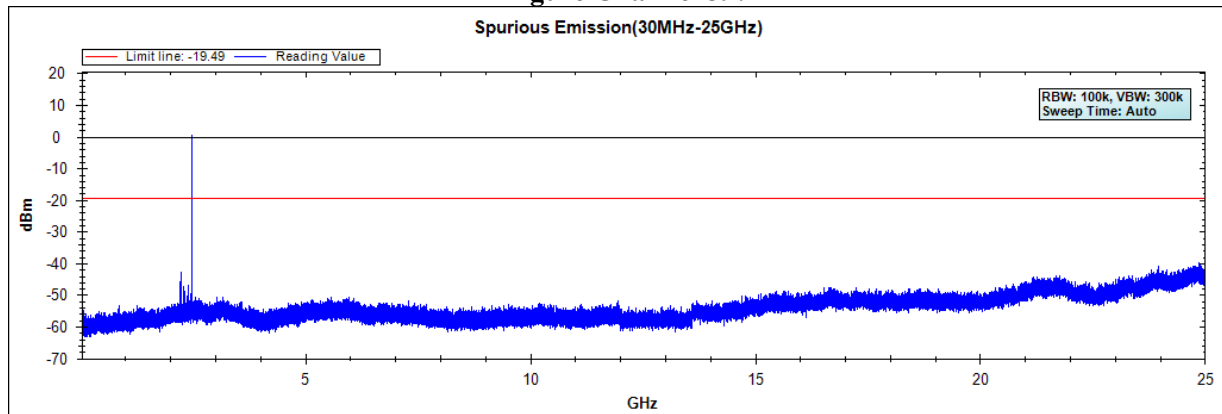


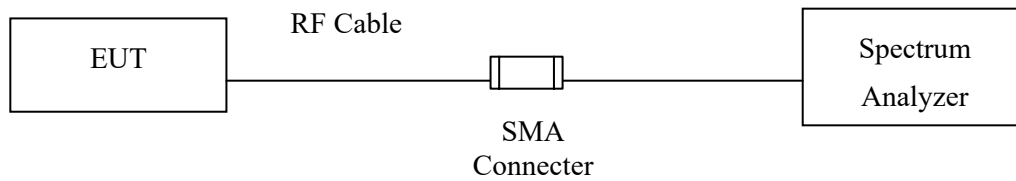
Figure Channel 39:



6. Band Edge

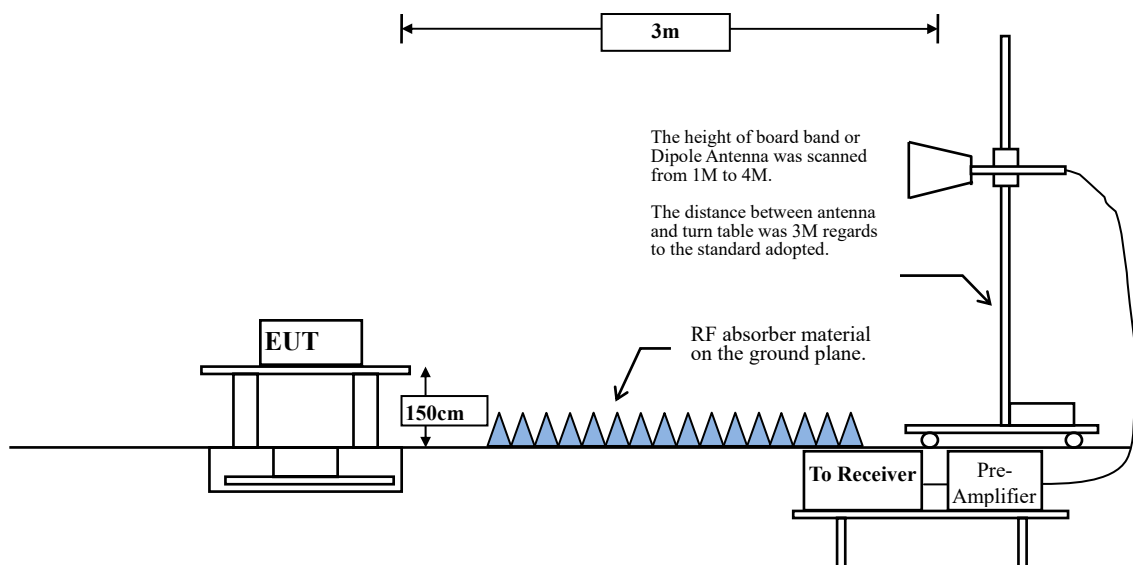
6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



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 was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

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 from 1 meter to 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.

RBW and VBW Parameter setting:

According to KDB 558074 section 12.2.4. Peak power measurement procedure

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to KDB 558074 section 12.2.5. Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98 \%$

$VBW \geq 1/T$, when duty cycle $< 98 \%$

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
BLE	85.71	0.6	1667	2000

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

6.5. Test Result of Band Edge

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
00 (Peak)	2370.100	-2.775	48.293	45.518	74.00	54.00	Pass
00 (Peak)	2390.000	-2.687	44.338	41.651	74.00	54.00	Pass
00 (Peak)	2400.000	-2.660	66.022	63.362	--	--	--
00 (Peak)	2401.700	-2.658	96.621	93.963	--	--	--
00 (Average)	2370.100	-2.775	41.062	38.287	74.00	54.00	Pass
00 (Average)	2390.000	-2.687	31.101	28.414	74.00	54.00	Pass
00 (Average)	2400.000	-2.660	46.846	44.186	--	--	--
00 (Average)	2402.000	-2.657	90.083	87.426	--	--	--

Figure Channel 00:

Horizontal (Peak)

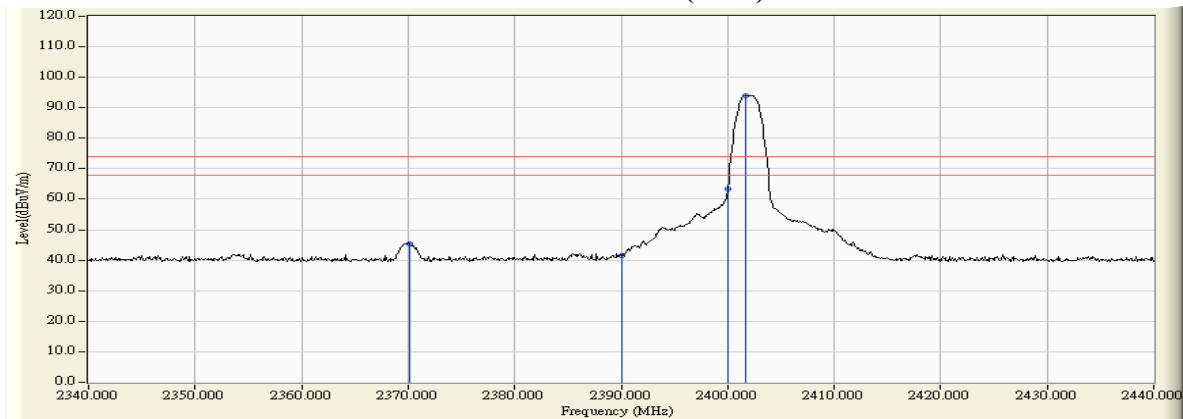
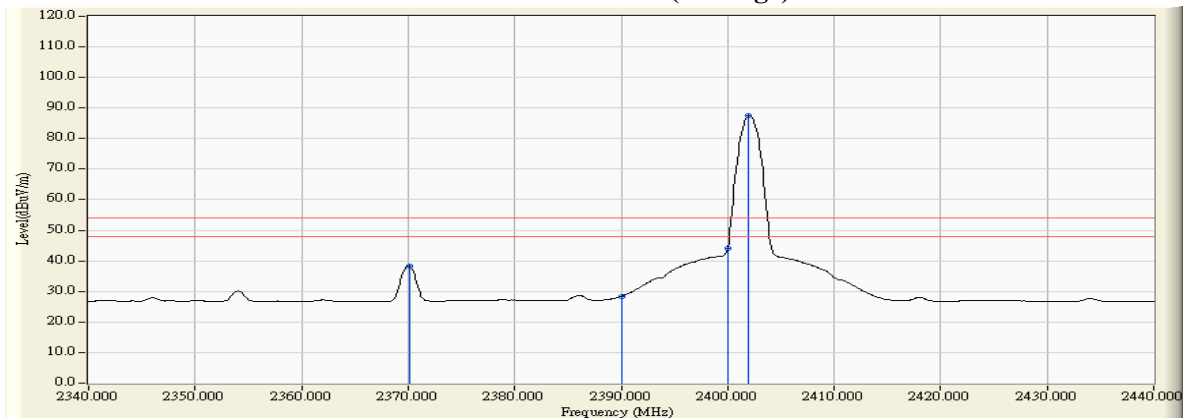


Figure Channel 00:

Horizontal (Average)



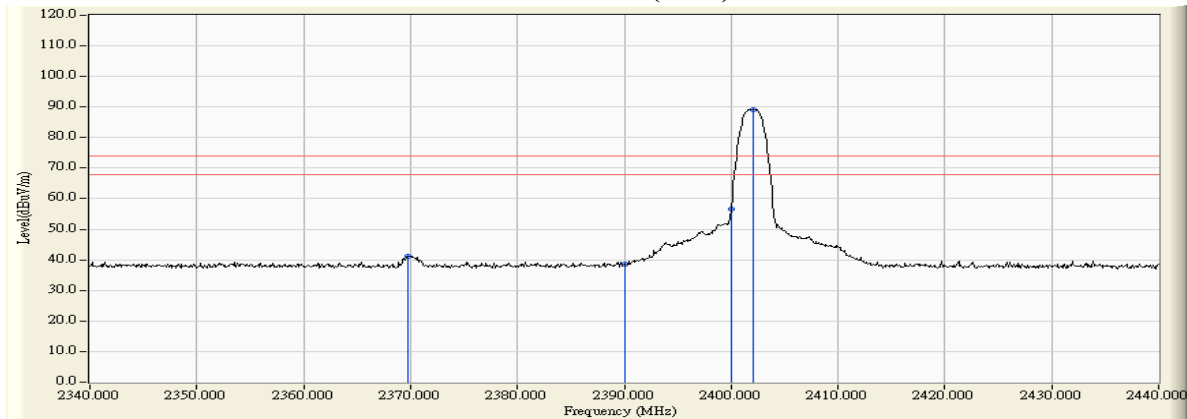
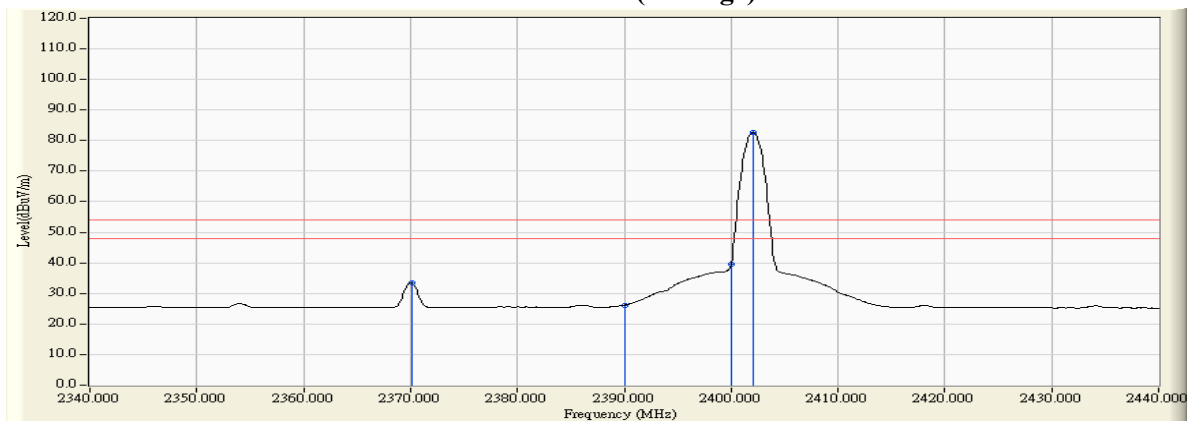
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB μ V)	Emission Level (dB μ V/m)	Peak Limit (dB μ V/m)	Average Limit (dB μ V/m)	Result
00 (Peak)	2369.700	-4.089	45.359	41.269	74.00	54.00	Pass
00 (Peak)	2390.000	-4.159	42.828	38.669	74.00	54.00	Pass
00 (Peak)	2400.000	-4.171	60.853	56.682	--	--	--
00 (Peak)	2402.100	-4.171	93.361	89.190	--	--	--
00 (Average)	2370.100	-4.092	37.532	33.441	74.00	54.00	Pass
00 (Average)	2390.000	-4.159	30.368	26.209	74.00	54.00	Pass
00 (Average)	2400.000	-4.171	43.867	39.696	--	--	--
00 (Average)	2402.100	-4.171	86.754	82.583	--	--	--

Figure Channel 00: Vertical (Peak)

Figure Channel 00: Vertical (Average)


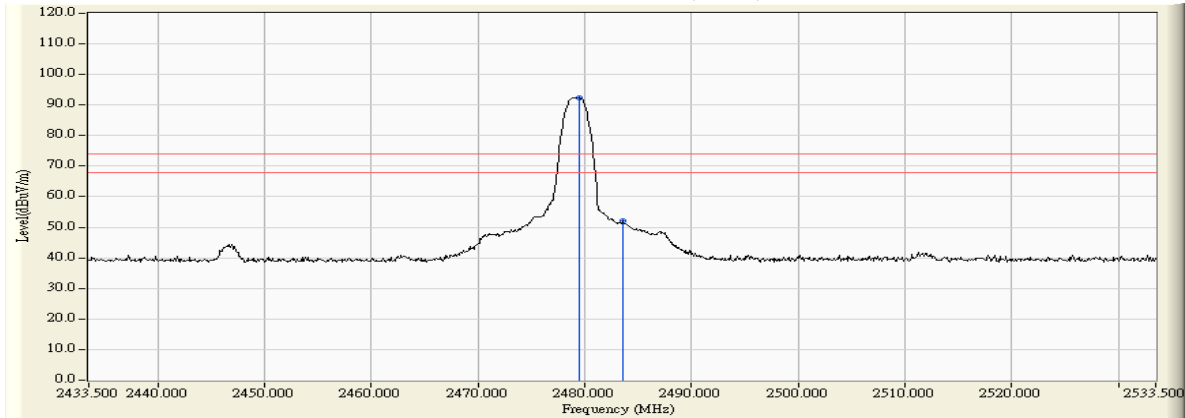
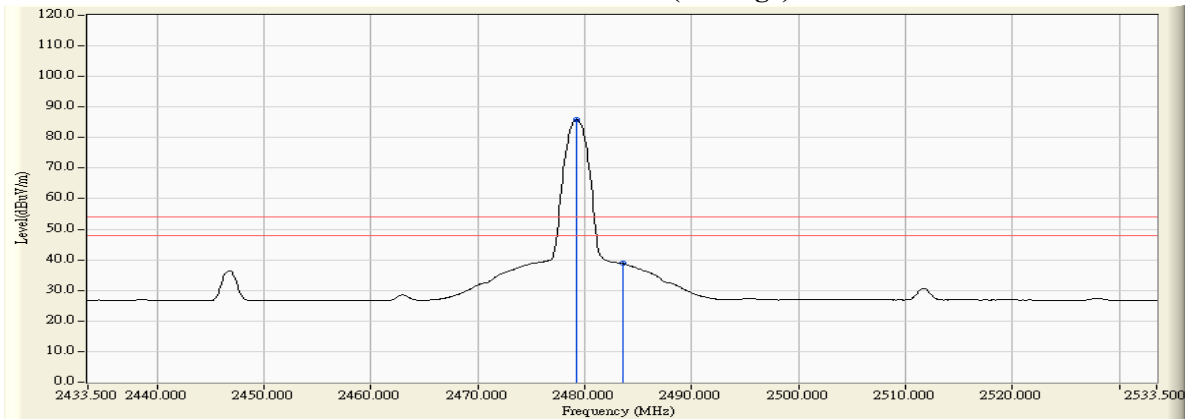
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
39 (Peak)	2479.500	-2.605	94.868	92.263	--	--	--
39 (Peak)	2483.500	-2.601	54.587	51.985	74.00	54.00	Pass
39 (Average)	2479.200	-2.606	88.416	85.810	--	--	--
39 (Average)	2483.500	-2.601	41.399	38.797	74.00	54.00	Pass

Figure Channel 39:**Horizontal (Peak)****Figure Channel 39:****Horizontal (Average)**

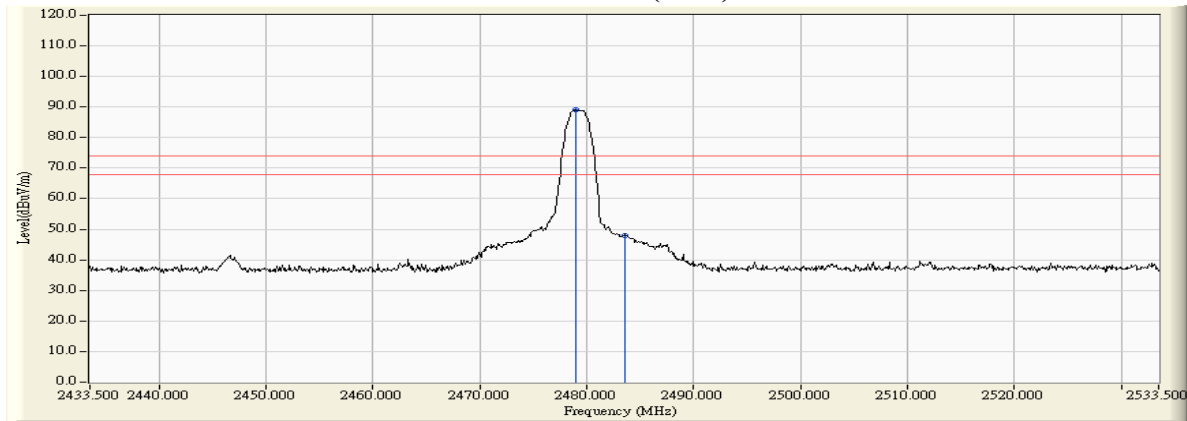
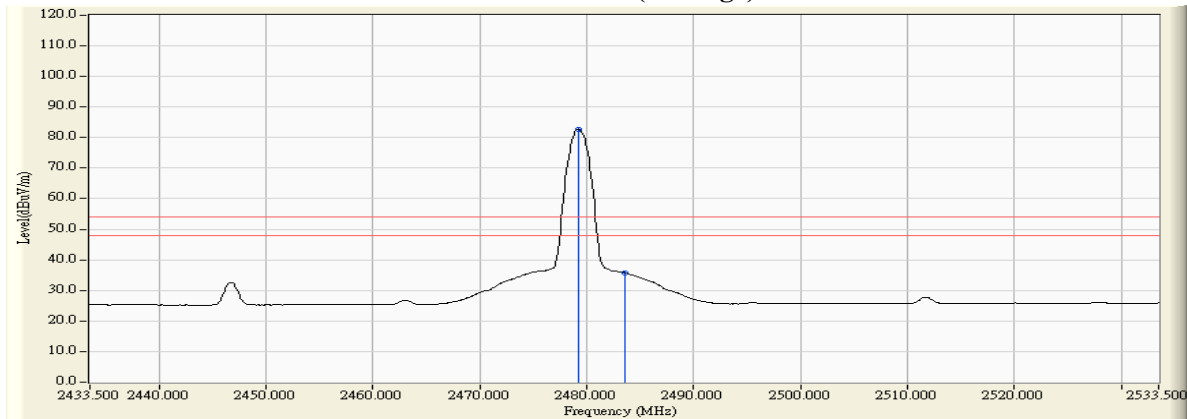
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test date : 2018/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
39 (Peak)	2479.000	-3.981	92.940	88.959	--	--	--
39 (Peak)	2483.500	-3.966	51.827	47.860	74.00	54.00	Pass
39 (Average)	2479.200	-3.980	86.698	82.718	--	--	--
39 (Average)	2483.500	-3.966	39.789	35.822	74.00	54.00	Pass

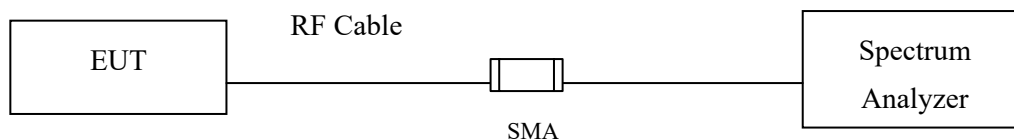
Figure Channel 39: Vertical (Peak)**Figure Channel 39: Vertical (Average)**

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection.

7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, $VBW \geq 3 \cdot RBW$

7.4. Uncertainty

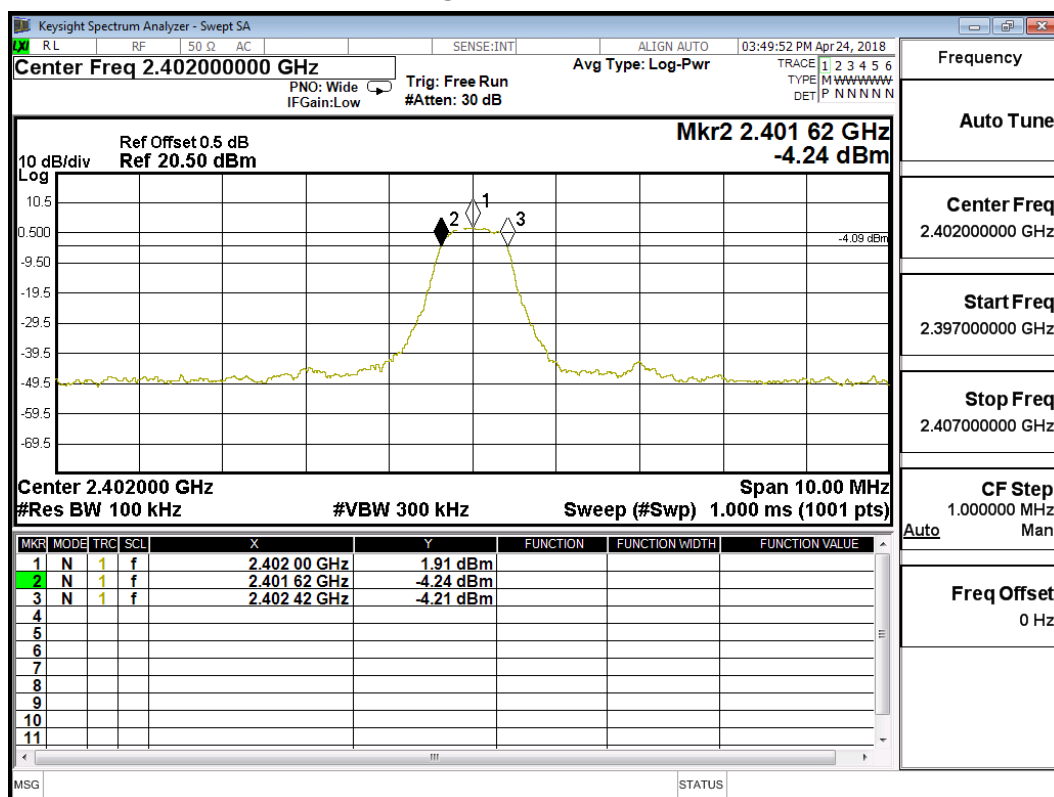
$\pm 283\text{Hz}$

7.5. Test Result of 6dB Bandwidth

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	800	>500	Pass

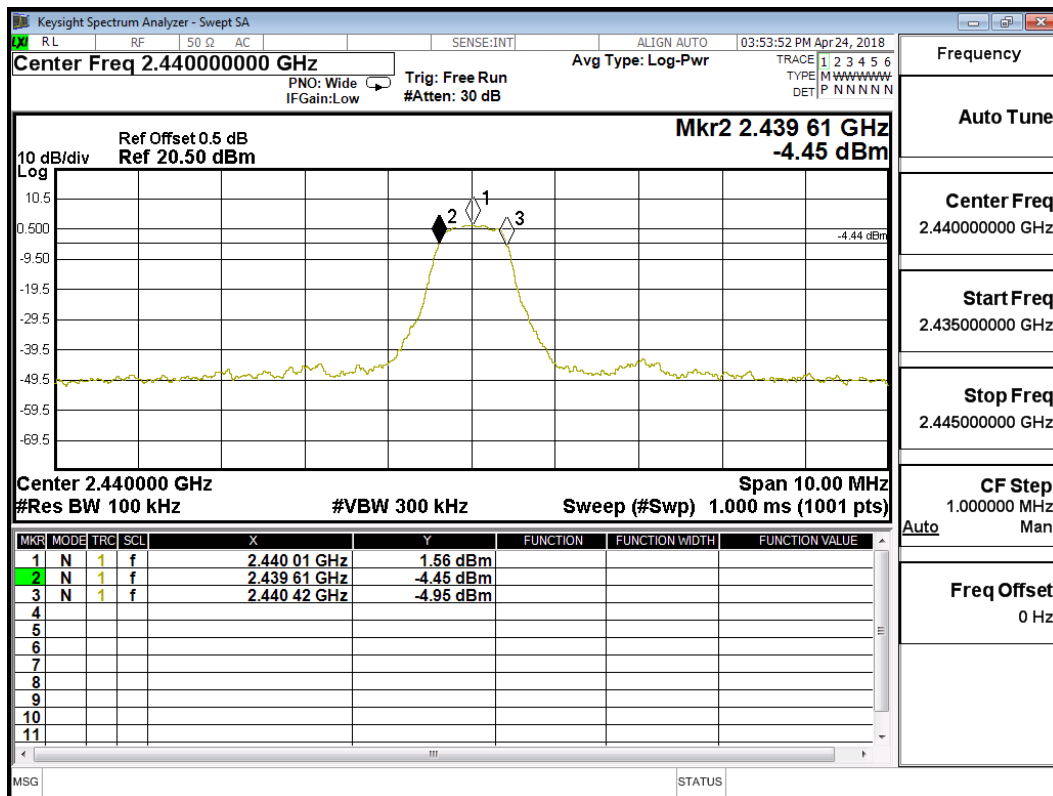
Figure Channel 00:



Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	810	>500	Pass

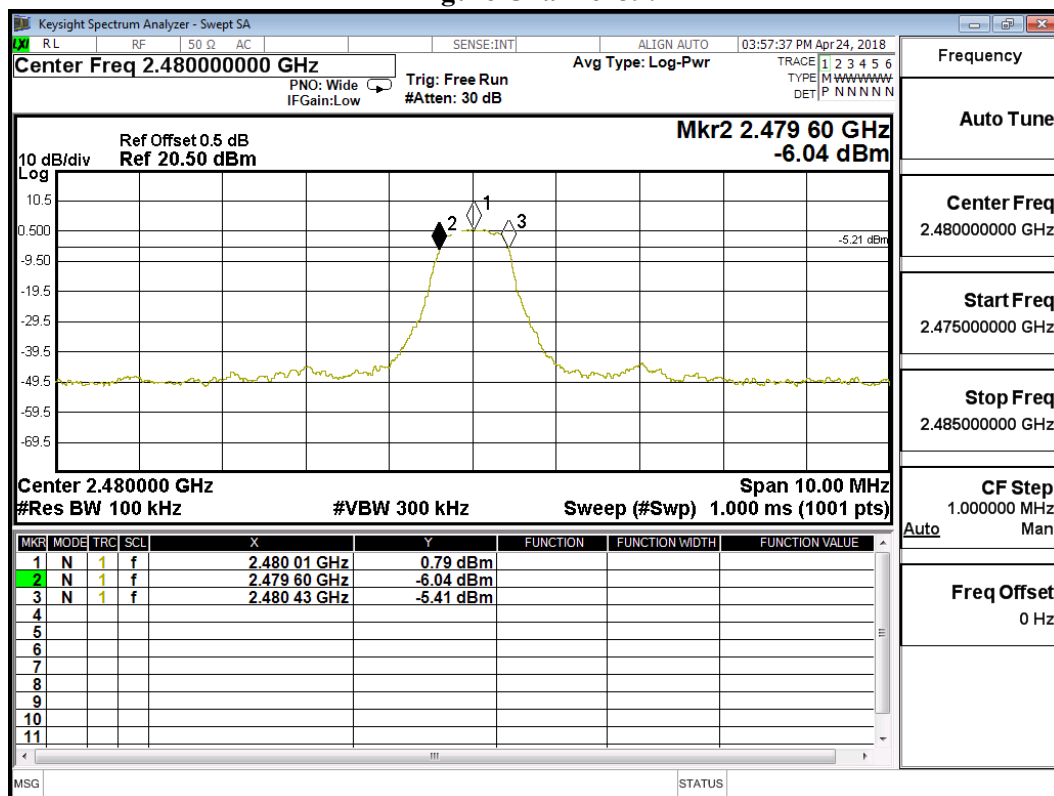
Figure Channel 19:



Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : 6dB Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

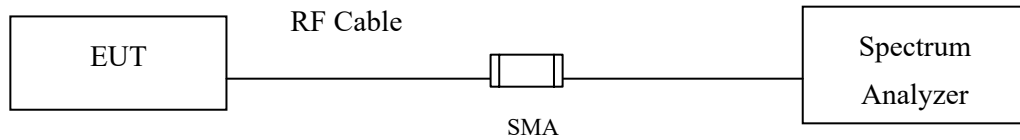
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	830	>500	Pass

Figure Channel 39:



8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.4. Uncertainty

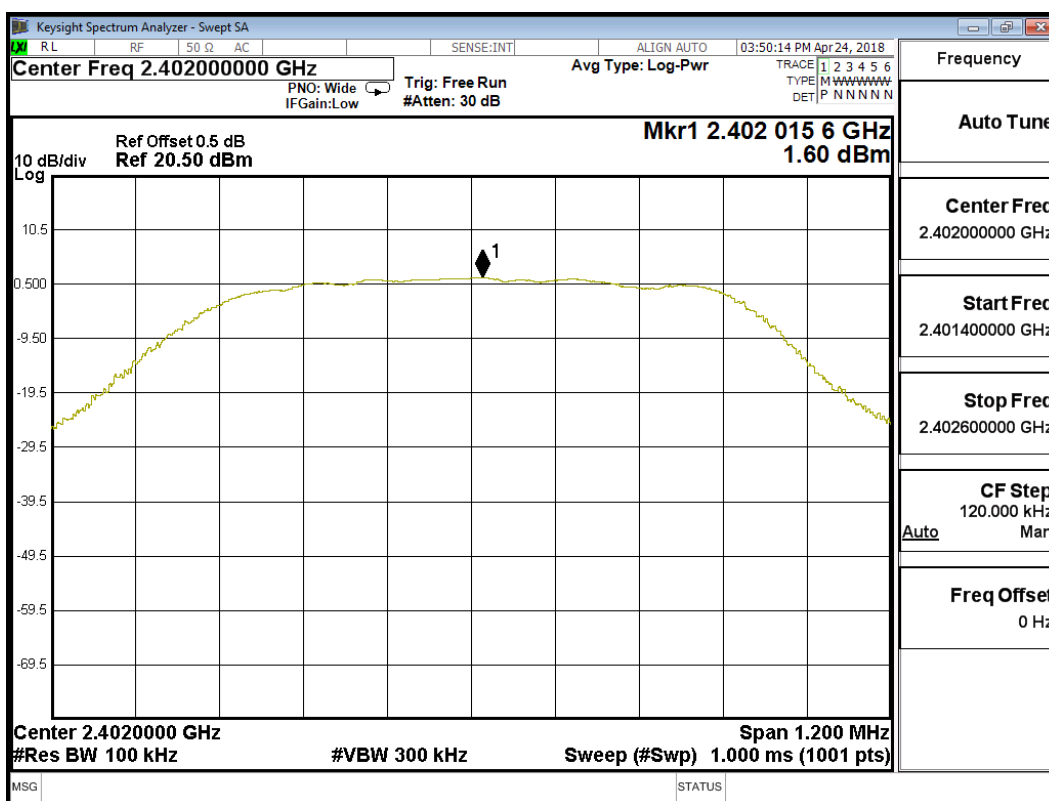
± 1.20 dB

8.5. Test Result of Power Density

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	1.60	$\leq 8\text{dBm}$	Pass

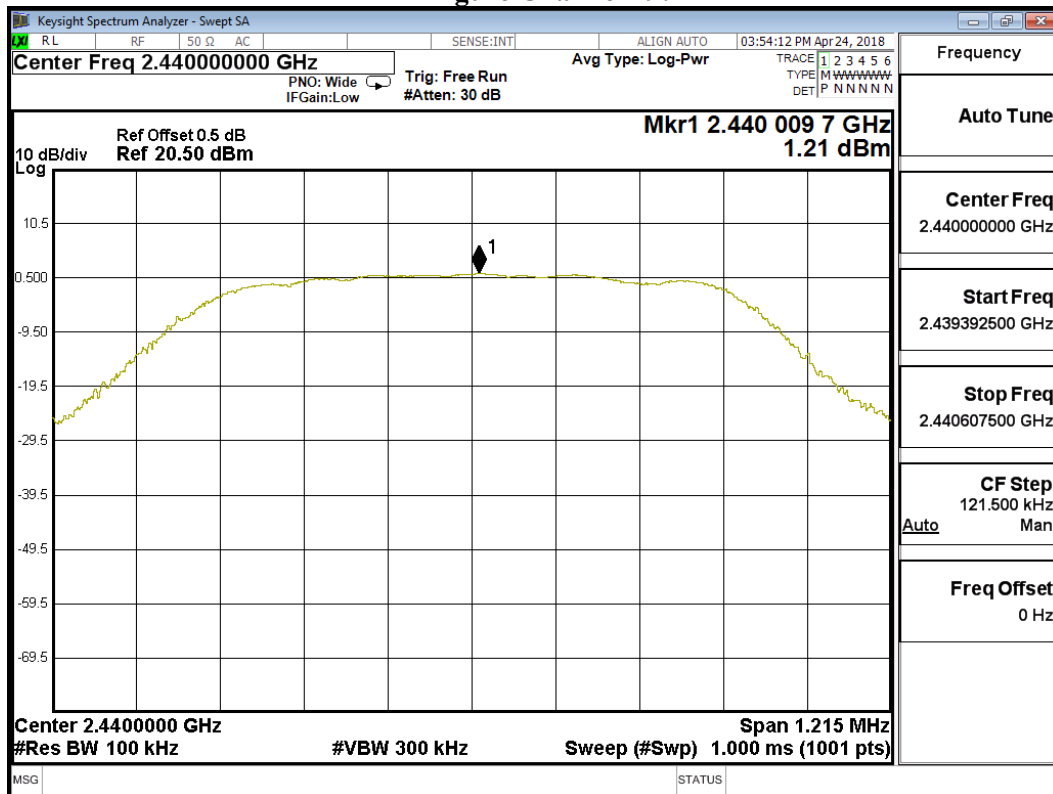
Figure Channel 00:



Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2440	1.21	$\leq 8\text{dBm}$	Pass

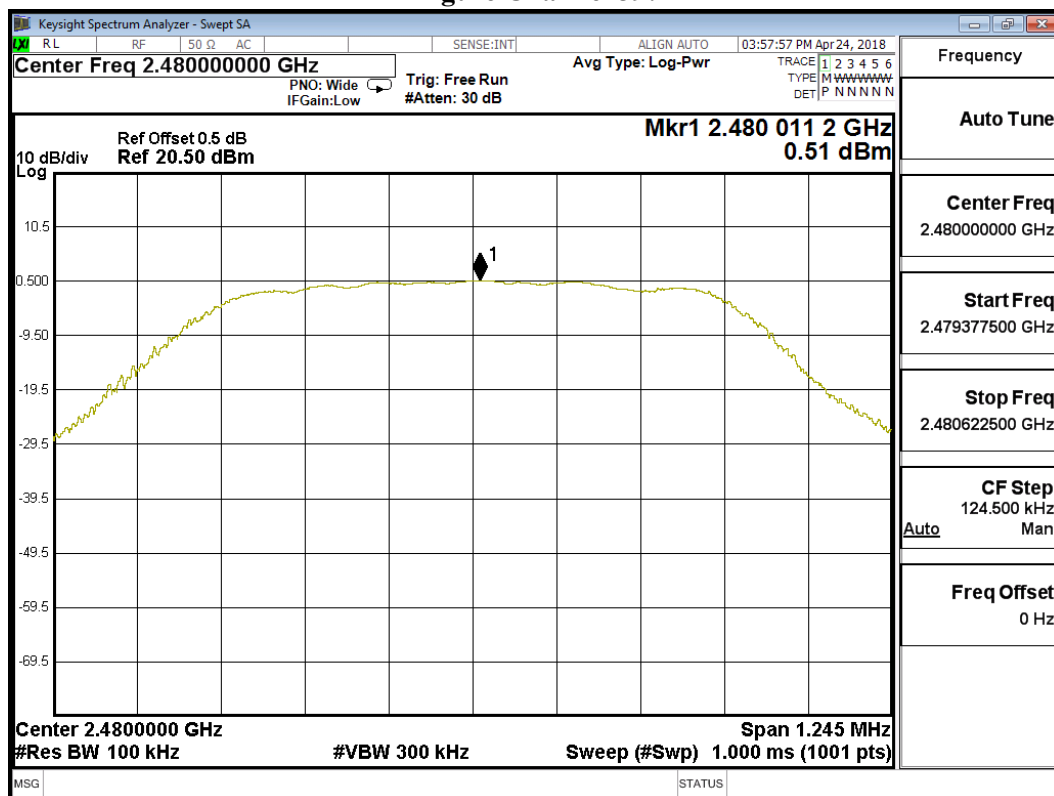
Figure Channel 19:



Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

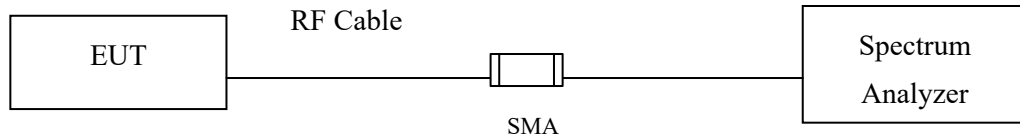
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	0.51	$\leq 8\text{dBm}$	Pass

Figure Channel 39:



9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

9.3. Uncertainty

$\pm 2.31\text{msec}$

9.4. Test Result of Duty Cycle

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Duty Cycle
 Test Mode : Mode 1: Transmit - BLE (GFSK)

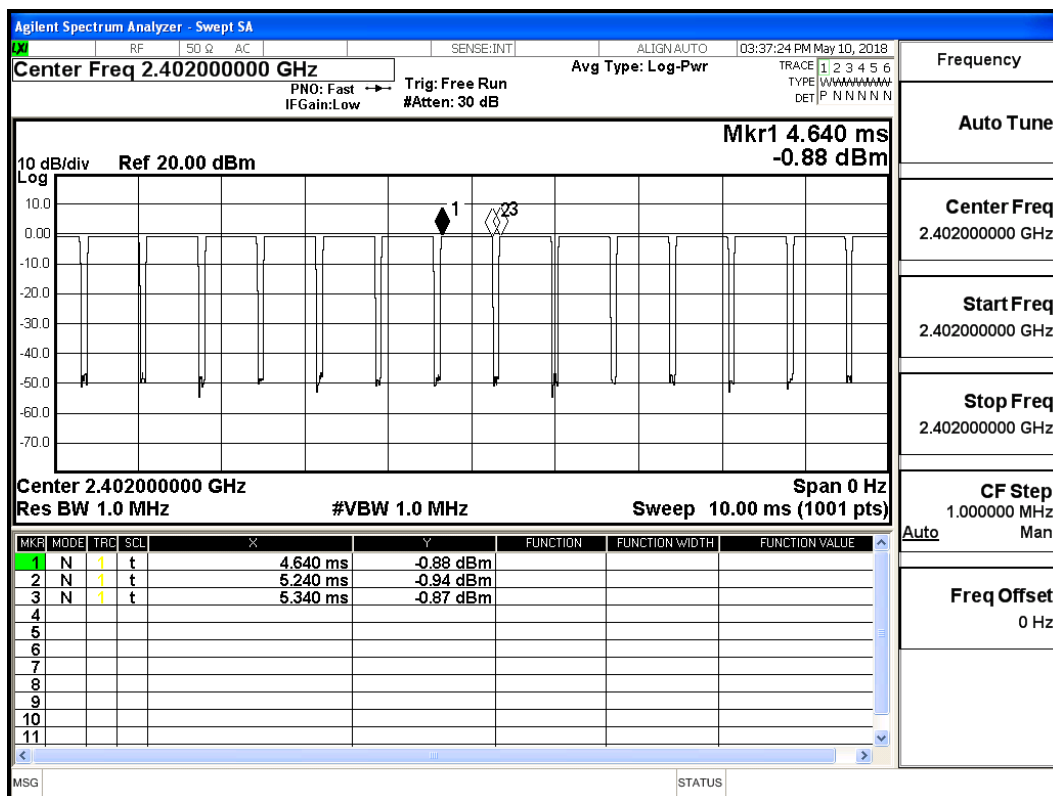
Duty Cycle Formula:

Duty Cycle = $\text{Ton} / (\text{Ton} + \text{Toff})$

Duty Factor = $10 \text{ Log } (1/\text{Duty Cycle})$

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.600	0.700	85.71	0.67



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.