FCC Test Report

Product Name	Automatic Upper Arm Blood Pressure Monitor
Model No.	HL858CP
FCC ID.	2ABTAHNL85CP

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

Date of Receipt	Oct. 22, 2018
Issued Date	Nov. 15, 2018
Report No.	18A0293R-RFUSP01V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

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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.	HL858CP
FCC ID.	2ABTAHNL85CP
EUT Rated Voltage	AC 100-240V / 47-63Hz or DC 6V (Power by Battery)
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 15.247 Meas Guidance v05
Test Result	Complied

Documented By : Jinn Chen

(Senior Adm. Specialist / Jinn Chen)

Tested By : Ivan Chuang

(Senior Engineer / Ivan Chuang)

Approved By :

(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Automatic Upper Arm Blood Pressure Monitor
Trade Name	Health & Life
Model No.	HL858CP
FCC ID.	2ABTAHNL85CP
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: 100-240V~47-63Hz, 04-0.2A Output: 5.99V⎓, 2A max Cable Out: Shielded 1.3m with one ferrite core bonded.

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	SIGNAL ELECTRONICS CO., LTD.	SMD8105-A0X	PCB Antenna	-2.39556dBi for 2.4 GHz

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

Center Frequency of Each Channel: (For Bluetooth 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 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 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.

Test Mode	Mode 1: Transmit - BLE

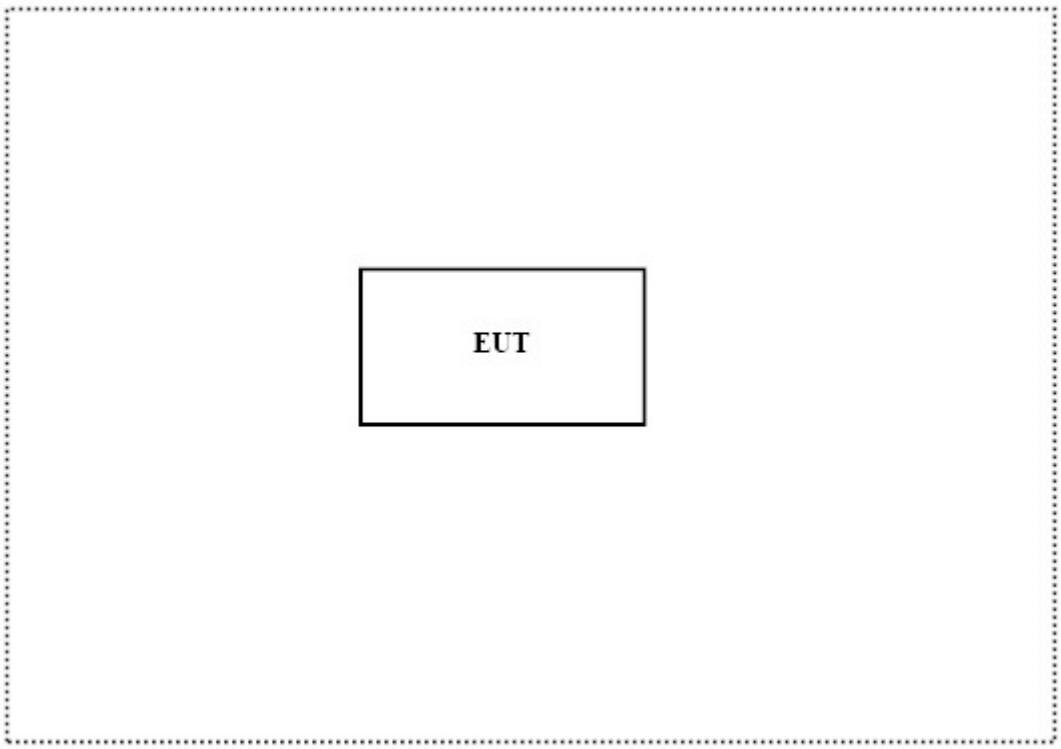
1.3. Tested System Details

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
N/A				

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4.

(2) Press the button of EUT.

(3) Configure the test mode, the test channel.

(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

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:
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New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW0023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2018.02.08	2019.02.07
X	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
X	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2018.05.24	2019.05.23

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
X	Spectrum Analyzer	R&S	FSV30	103464	2018.01.23	2019.01.22
X	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531025	2017.12.11	2018.12.10
	Bluetooth Tester	R&S	CBT	101238	2018.01.18	2019.01.17

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 : DEKRA Conduction Test System V9.0.1.

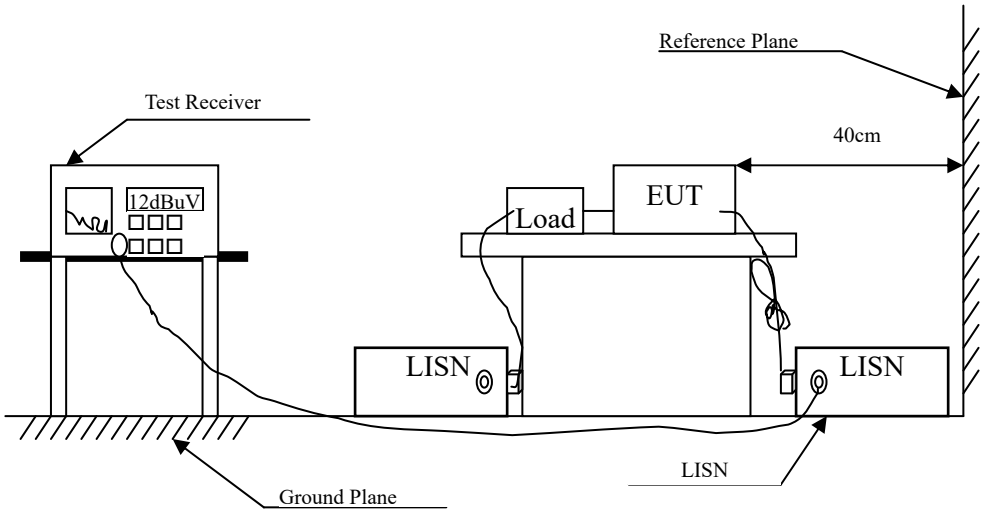
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2018.04.02	2019.04.01
X	Horn Antenna	ETS-Lindgren	3117	00203761	2018.11.01	2019.10.30
X	Horn Antenna	Com-Power	AH-840	101087	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC001330	980316	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2018.05.16	2019.05.15
X	Filter	MICRO TRONICS	BRM50702	G251	2018.09.04	2019.09.03
	Filter	MICRO TRONICS	BRM50716	G188	2018.09.04	2019.09.03
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2018.05.25	2019.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2018.05.16	2019.05.15

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 (dBuV) 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 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 DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit - BLE (2440MHz)
Test Date : 2018/11/05

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.154	9.611	29.439	39.050	-26.836	65.886
0.562	9.630	28.749	38.379	-17.621	56.000
1.115	9.640	17.777	27.417	-28.583	56.000
1.600	9.650	16.115	25.765	-30.235	56.000
2.600	9.676	14.884	24.560	-31.440	56.000
24.580	10.010	29.841	39.851	-20.149	60.000
Average					
0.154	9.611	7.999	17.610	-38.276	55.886
0.562	9.630	11.335	20.965	-25.035	46.000
1.115	9.640	3.667	13.307	-32.693	46.000
1.600	9.650	0.791	10.441	-35.559	46.000
2.600	9.676	0.726	10.402	-35.598	46.000
24.580	10.010	24.958	34.968	-15.032	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	:	Automatic Upper Arm Blood Pressure Monitor
Test Item	:	Conducted Emission Test
Power Line	:	Line 2
Test Mode	:	Mode 1: Transmit - BLE (2440MHz)
Test Date	:	2017/09/27

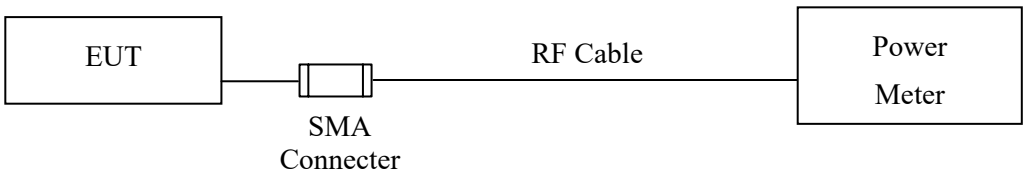
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.157	9.602	29.076	38.678	-27.122	65.800
0.180	9.606	26.265	35.871	-29.272	65.143
0.552	9.622	28.281	37.903	-18.097	56.000
1.105	9.640	18.682	28.322	-27.678	56.000
3.600	9.706	16.050	25.756	-30.244	56.000
24.580	10.050	28.768	38.818	-21.182	60.000
Average					
0.157	9.602	8.257	17.859	-37.941	55.800
0.180	9.606	6.184	15.790	-39.353	55.143
0.552	9.622	11.843	21.465	-24.535	46.000
1.105	9.640	3.238	12.878	-33.122	46.000
3.600	9.706	3.661	13.367	-32.633	46.000
24.580	10.050	23.993	34.043	-15.957	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

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 8.3.1.3 PKPM1 Peak power meter method.

3.4. Uncertainty

±0.86 dB

3.5. Test Result of Peak Power Output

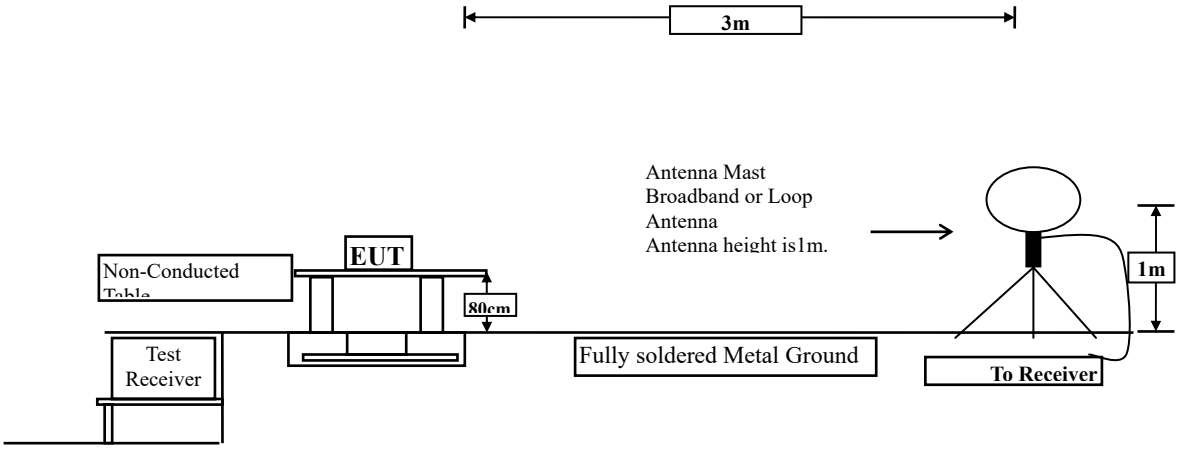
Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/02

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	-3.29	1 Watt= 30 dBm	Pass
Channel 19	2440.00	-3.69	1 Watt= 30 dBm	Pass
Channel 39	2480.00	-4.21	1 Watt= 30 dBm	Pass

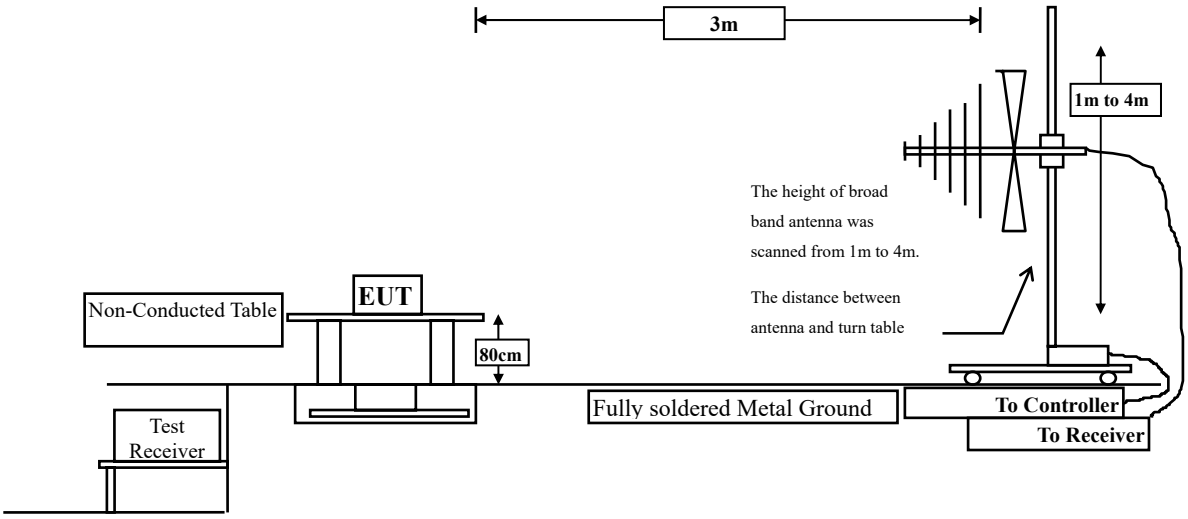
4. Radiated Emission

4.1. Test Setup

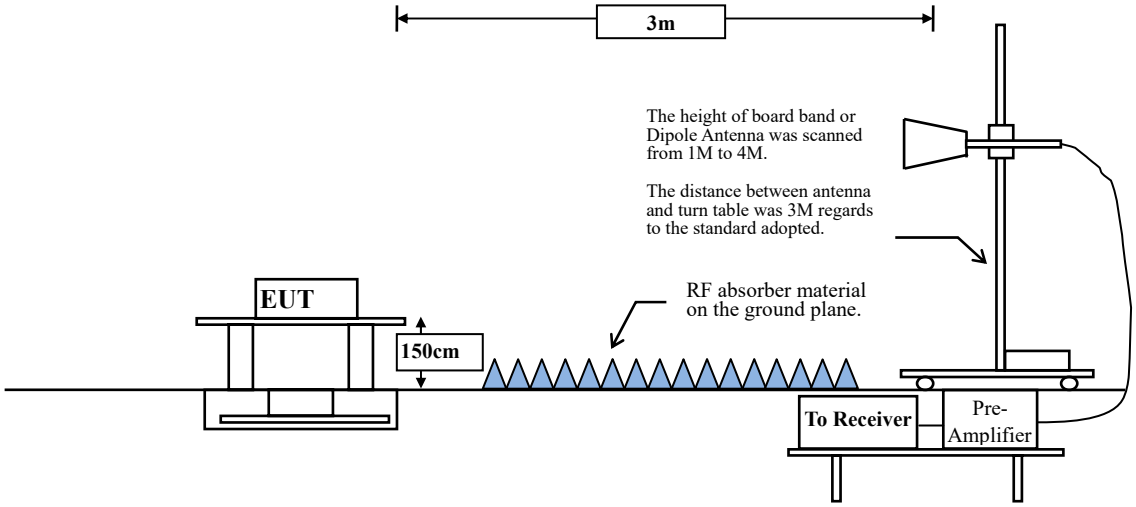
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission 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 (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 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 measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 558074 Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x 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 Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 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	50.30	0.6014	1663	2k

Note: Duty Cycle Refer to Section 9

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

4.5. Test Result of Radiated Emission

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit - BLE(2402MHz)
Test Date : 2018/11/05

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	-6.081	56.130	50.049	-23.951	74.000
7206.000	-3.033	47.900	44.867	-29.133	74.000
9608.000	-0.774	47.270	46.497	-27.503	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4804.000	-6.081	58.820	52.739	-21.261	74.000
7206.000	-3.033	47.550	44.517	-29.483	74.000
9608.000	-0.774	47.280	46.507	-27.493	74.000
Average					
Detector:					
--					54.000

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 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 Mode : Mode 1: Transmit - BLE (2440MHz)
Test Date : 2018/11/05

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4880.000	-6.045	52.890	46.845	-27.155	74.000
7320.000	-2.959	47.430	44.471	-29.529	74.000
9760.000	-0.492	46.770	46.278	-27.722	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4880.000	-6.045	55.770	49.725	-24.275	74.000
7320.000	-2.959	46.550	43.591	-30.409	74.000
9760.000	-0.492	46.810	46.318	-27.682	74.000
Average					
Detector:					
--					54.000

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 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 Mode : Mode 1: Transmit - BLE (2480MHz)
Test Date : 2018/11/05

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	-6.041	50.690	44.649	-29.351	74.000
7440.000	-2.805	48.630	45.825	-28.175	74.000
9920.000	-0.260	46.680	46.420	-27.580	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4960.000	-6.041	53.660	47.619	-26.381	74.000
7440.000	-2.805	49.810	47.005	-26.995	74.000
9920.000	-0.260	46.850	46.590	-27.410	74.000
Average					
Detector:					
--					54.000

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 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 Mode : Mode 1: Transmit - BLE (2440MHz)
Test Date : 2018/11/05

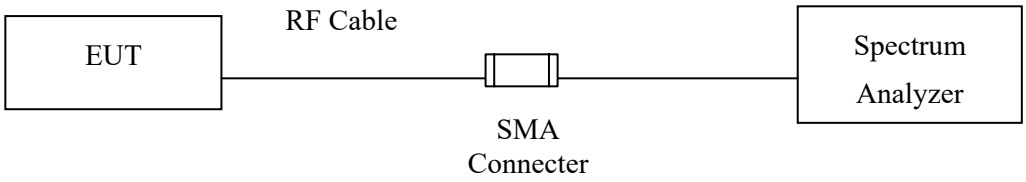
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
45.464	-10.829	32.958	22.129	-17.871	40.000
76.391	-14.908	36.664	21.756	-18.244	40.000
94.667	-16.920	40.501	23.580	-19.920	43.500
135.435	-11.864	36.976	25.112	-18.388	43.500
191.667	-13.602	34.797	21.194	-22.306	43.500
304.130	-10.242	33.472	23.229	-22.771	46.000
Vertical					
44.058	-10.875	35.247	24.371	-15.629	40.000
66.551	-13.101	36.809	23.708	-16.292	40.000
136.841	-11.730	33.637	21.906	-21.594	43.500
162.145	-10.904	32.352	21.448	-22.052	43.500
344.899	-9.298	32.499	23.201	-22.799	46.000
440.493	-7.032	32.251	25.219	-20.781	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

Tested according to DTS test procedure of KDB558074 section 8.5 DTS emissions in non-restricted frequency bands for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : RF Antenna Conducted Test
Test Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/02

Figure Channel 00:

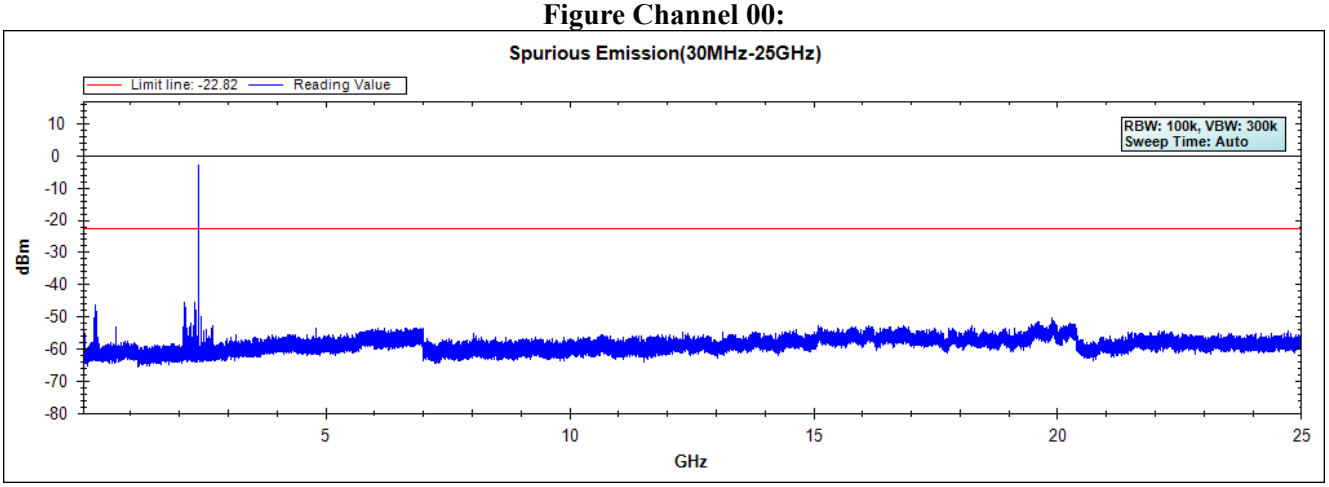


Figure Channel 19:

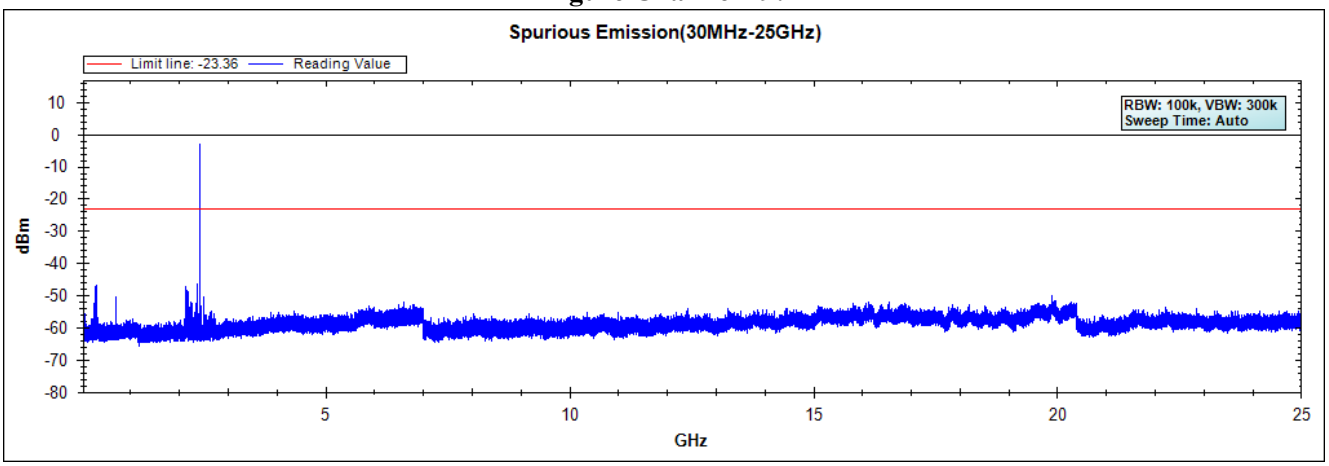
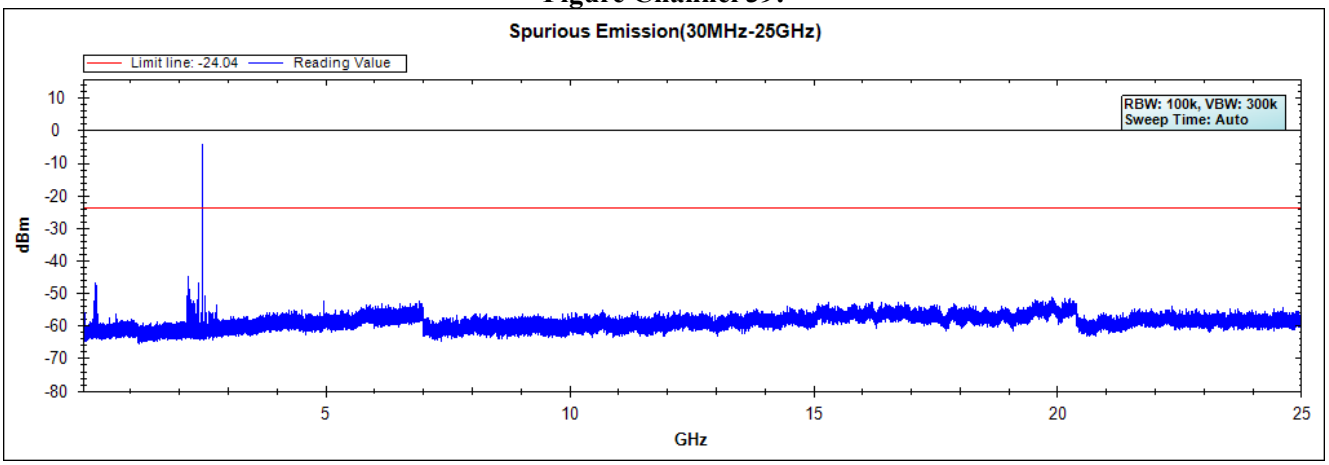


Figure Channel 39:

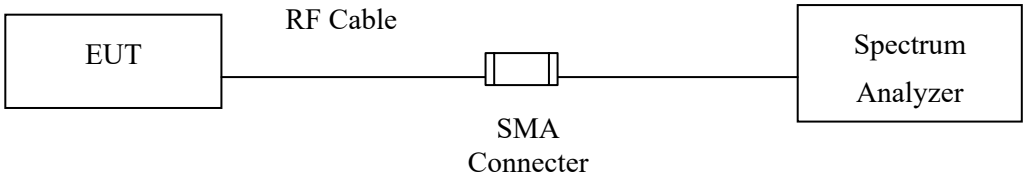


Note: The above test pattern is synthesized by multiple of the frequency range.

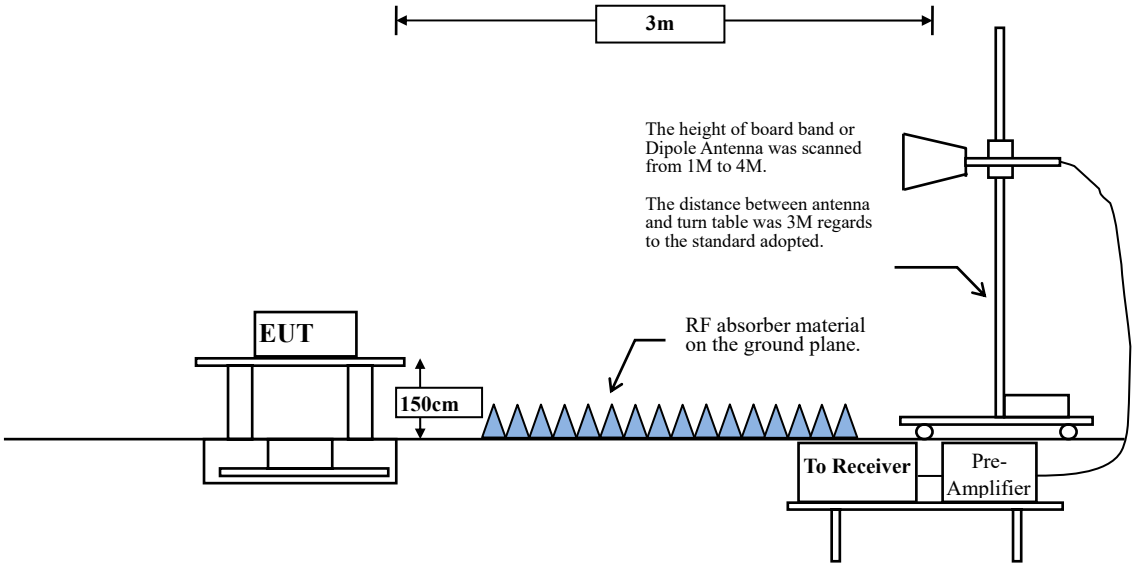
6. Band Edge

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 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 Peak power measurement procedure

RBW = as specified in Table 1.

VBW ≥ 3 x 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 Average power measurement procedure

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 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	50.30	0.6014	1663	2k

Note: Duty Cycle Refer to Section 9

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 : Automatic Upper Arm Blood Pressure Monitor
Test Item : Band Edge
Test Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/05

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
00 (Peak)	2372.754	10.193	38.602	48.795	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.288	47.550	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	44.010	54.313	--	--	Pass
00 (Peak)	2402.319	10.312	71.032	81.345	--	--	--
00 (Average)	2369.710	10.181	26.255	36.436	74.00	54.00	Pass
00 (Average)	2390.000	10.262	25.336	35.598	74.00	54.00	Pass
00 (Average)	2400.000	10.304	34.392	44.695	--	--	Pass
00 (Average)	2402.029	10.312	70.320	80.632	--	--	--

Figure Channel 00: Horizontal (Peak)

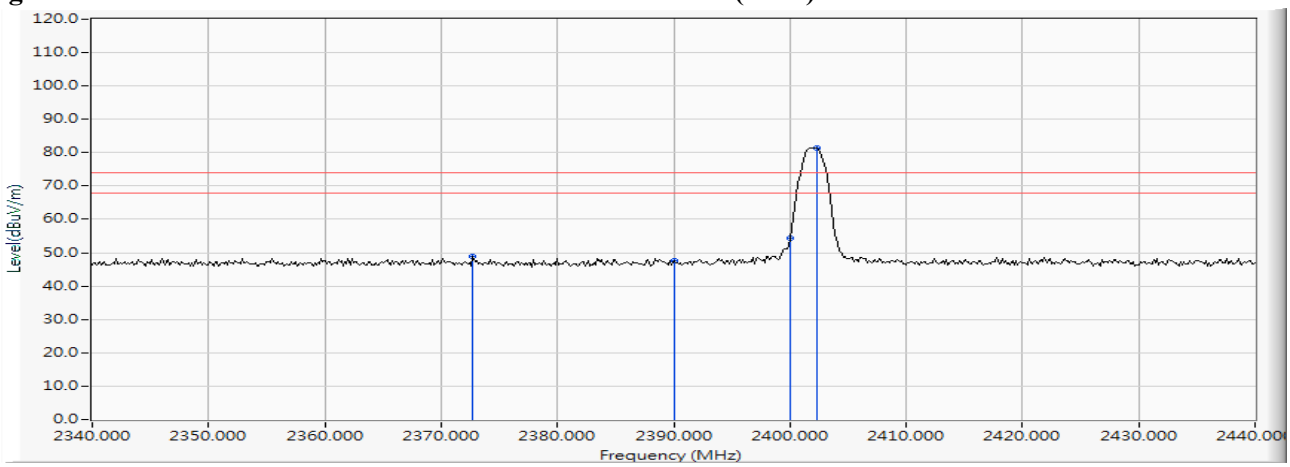
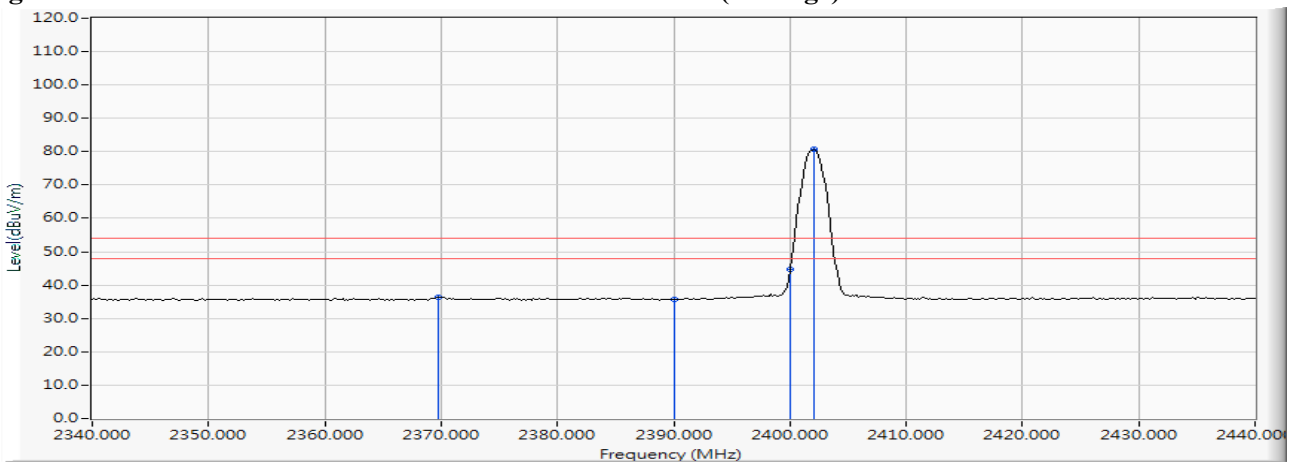


Figure Channel 00: Horizontal (Average)



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 Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/05

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
00 (Peak)	2388.841	10.257	39.058	49.315	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.476	47.738	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	44.039	54.342	--	--	Pass
00 (Peak)	2402.319	10.312	70.343	80.656	--	--	--
00 (Average)	2390.000	10.262	25.312	35.574	74.00	54.00	Pass
00 (Average)	2400.000	10.304	33.794	44.097	--	--	Pass
00 (Average)	2402.029	10.312	69.594	79.906	--	--	--

Figure Channel 00: Vertical (Peak)

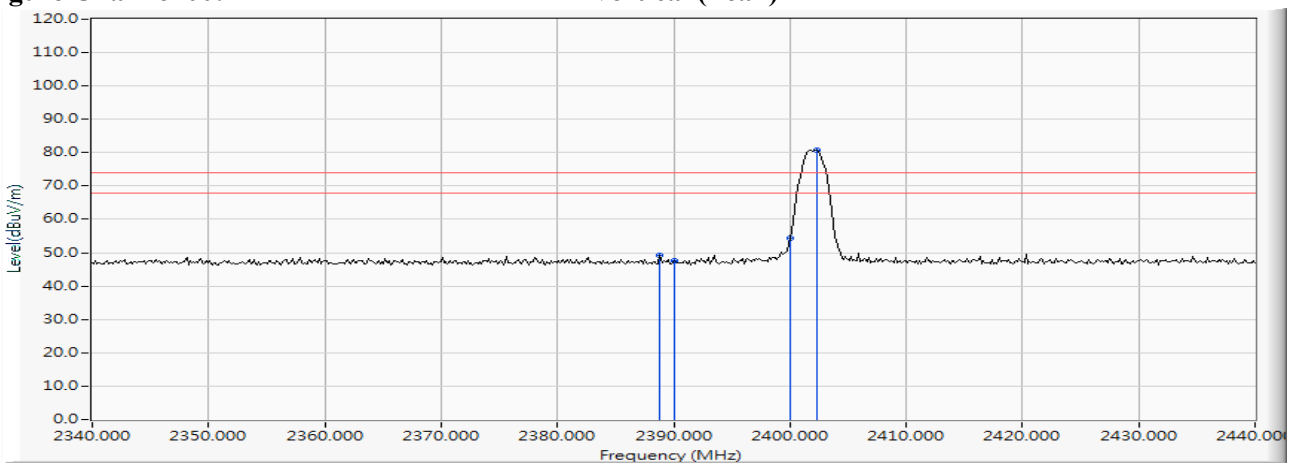
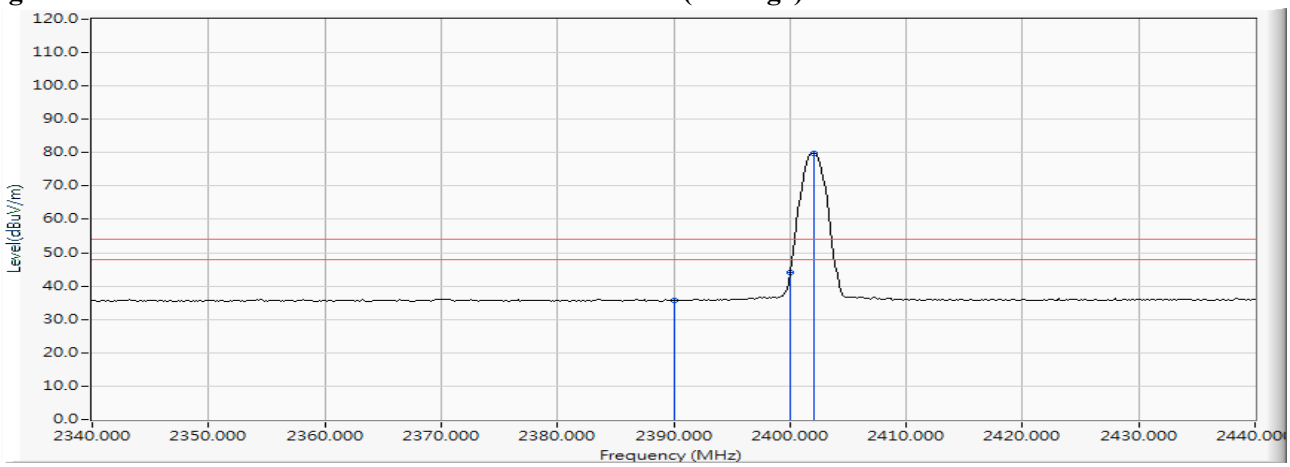


Figure Channel 00: Vertical (Average)



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 Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/05

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
39 (Peak)	2479.732	10.627	68.577	79.204	--	--	--
39 (Peak)	2483.500	10.640	37.317	47.958	74.00	54.00	Pass
39 (Peak)	2490.601	10.669	38.421	49.090	74.00	54.00	Pass
39 (Average)	2480.022	10.628	67.792	78.420	--	--	--
39 (Average)	2483.500	10.640	26.398	37.039	74.00	54.00	Pass

Figure Channel 39: Horizontal (Peak)

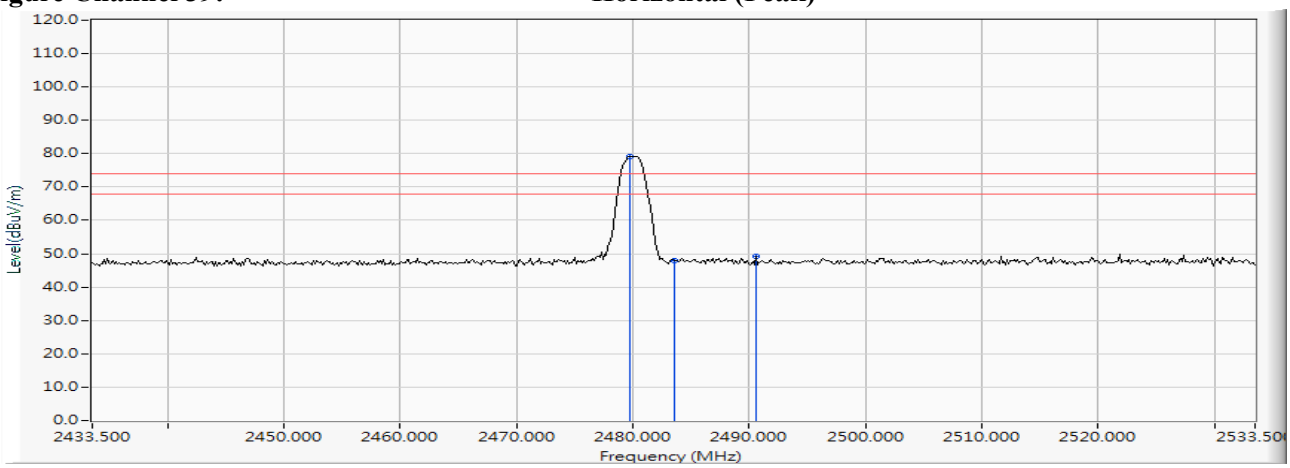
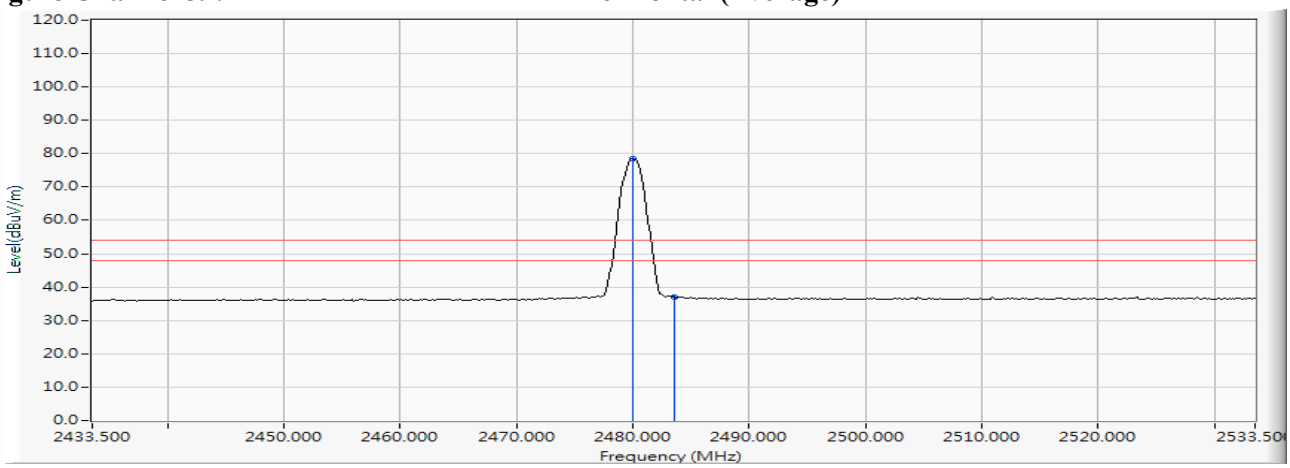


Figure Channel 39: Horizontal (Average)



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 Mode : Mode 1: Transmit - BLE
Test Date : 2018/11/05

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
39 (Peak)	2480.022	10.628	67.537	78.165	--	--	--
39 (Peak)	2483.500	10.640	37.062	47.703	74.00	54.00	Pass
39 (Peak)	2484.225	10.645	38.979	49.623	74.00	54.00	Pass
39 (Average)	2480.022	10.628	66.728	77.356	--	--	--
39 (Average)	2483.500	10.640	26.357	36.998	74.00	54.00	Pass

Figure Channel 39: Vertical (Peak)

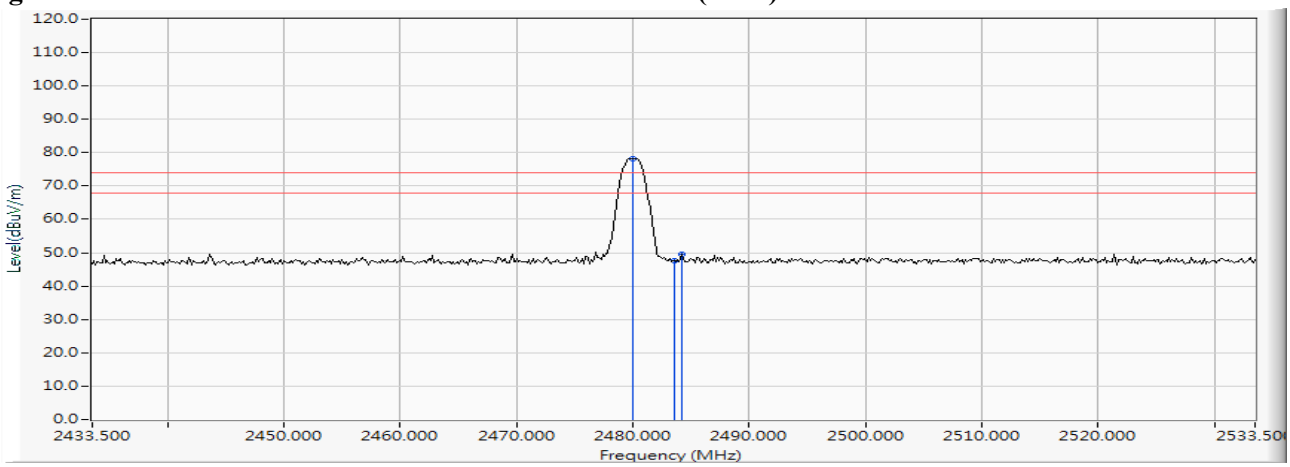
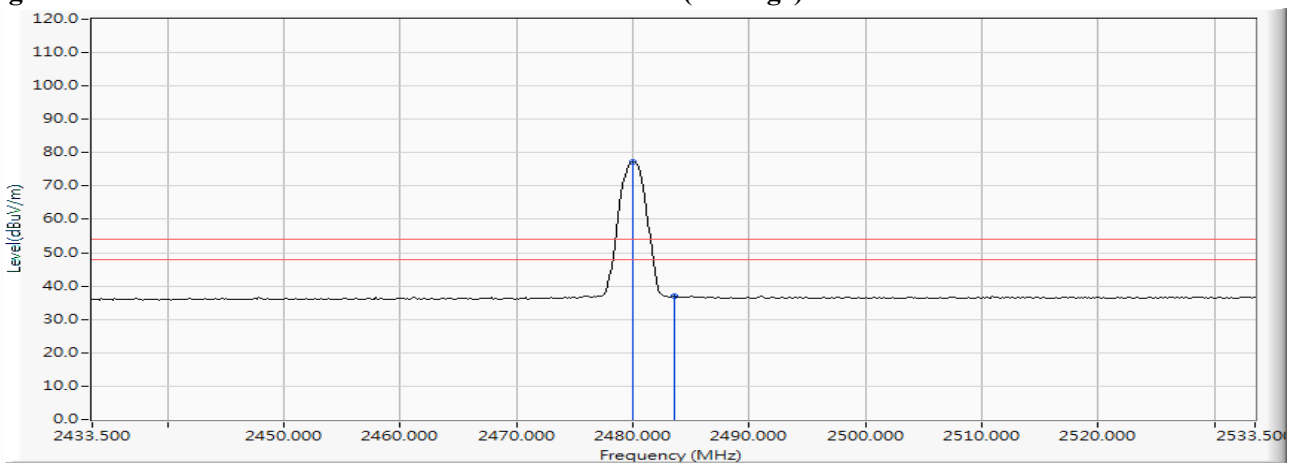


Figure Channel 39: Vertical (Average)

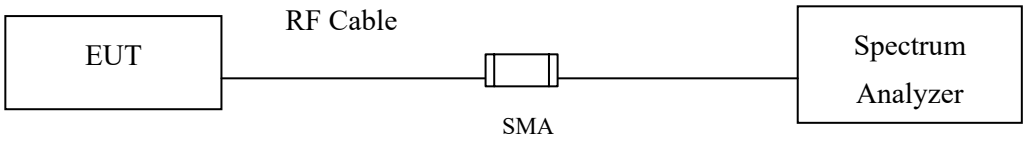


Note:

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

Tested according to DTS test procedure of KDB558074 section 8.2 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, VBW≥3*RBW

7.4. Uncertainty

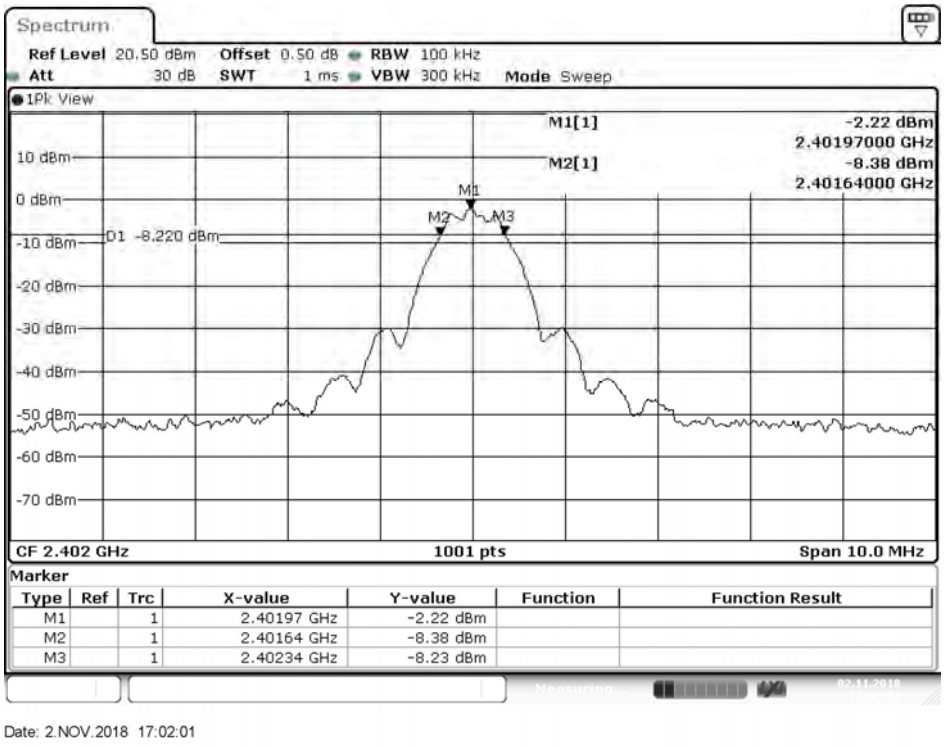
±279.2Hz

7.5. Test Result of 6dB Bandwidth

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	700	>500	Pass

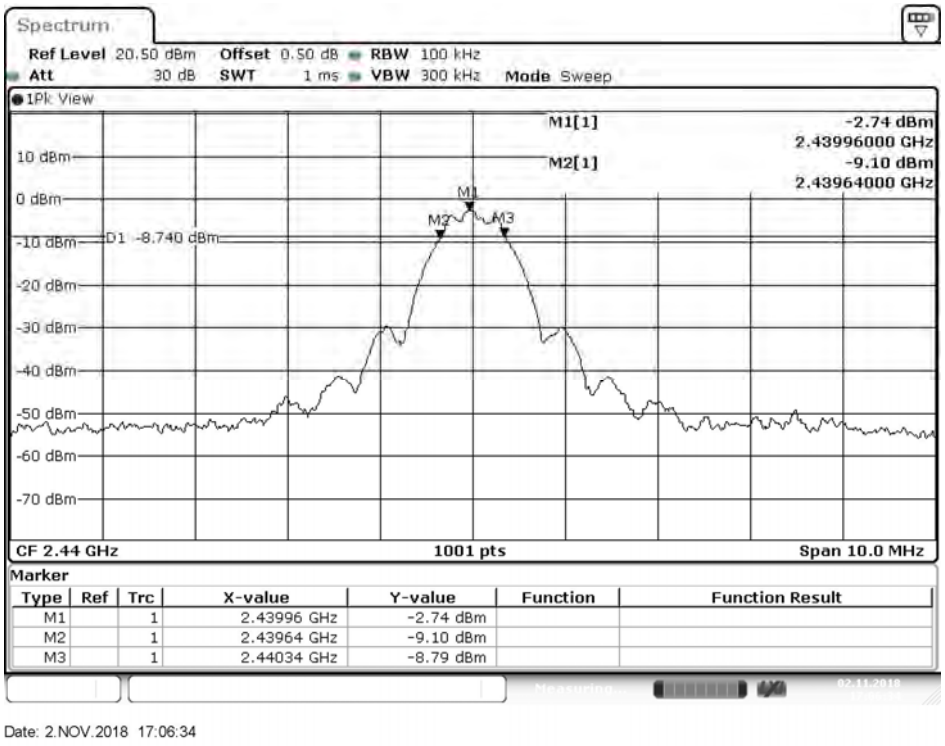
Figure Channel 00:



Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	700	>500	Pass

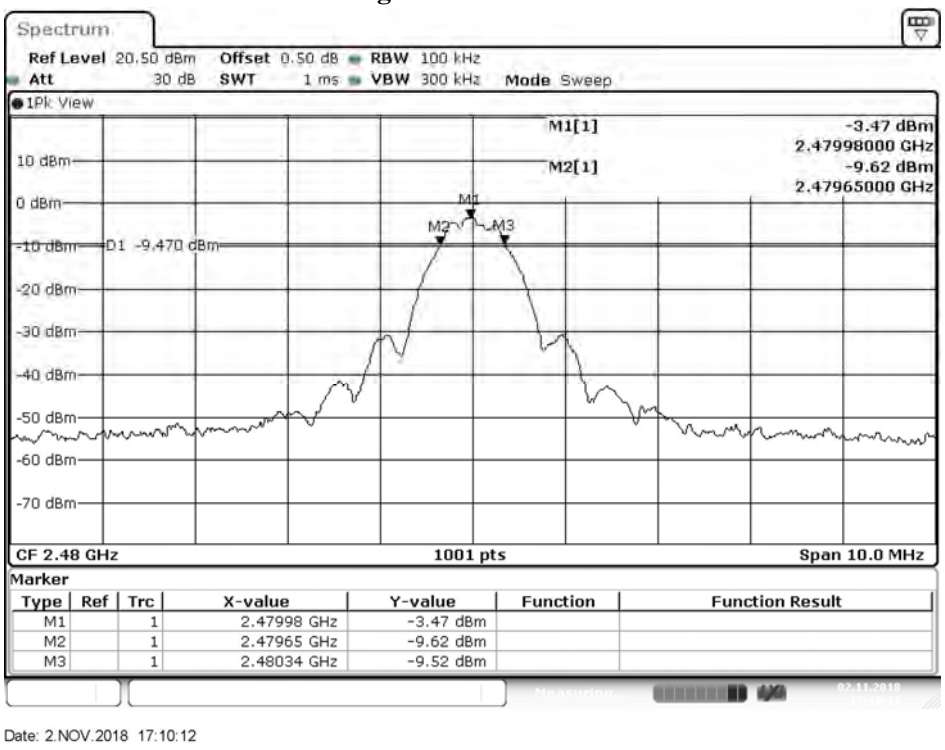
Figure Channel 19:



Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : 6dB Bandwidth Data
Test Mode : Mode 1: Transmit - BLE (2480MHz)

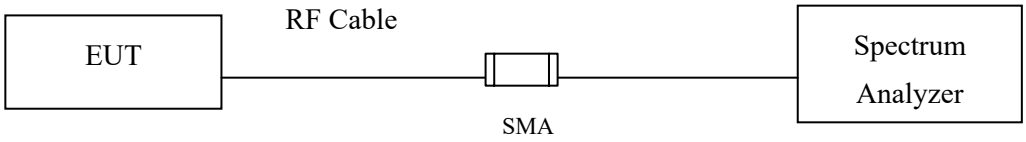
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	690	>500	Pass

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

Tested according to DTS test procedure of KDB558074 section 8.4 for compliance to FCC 47CFR 15.247 requirements.

8.4. Uncertainty

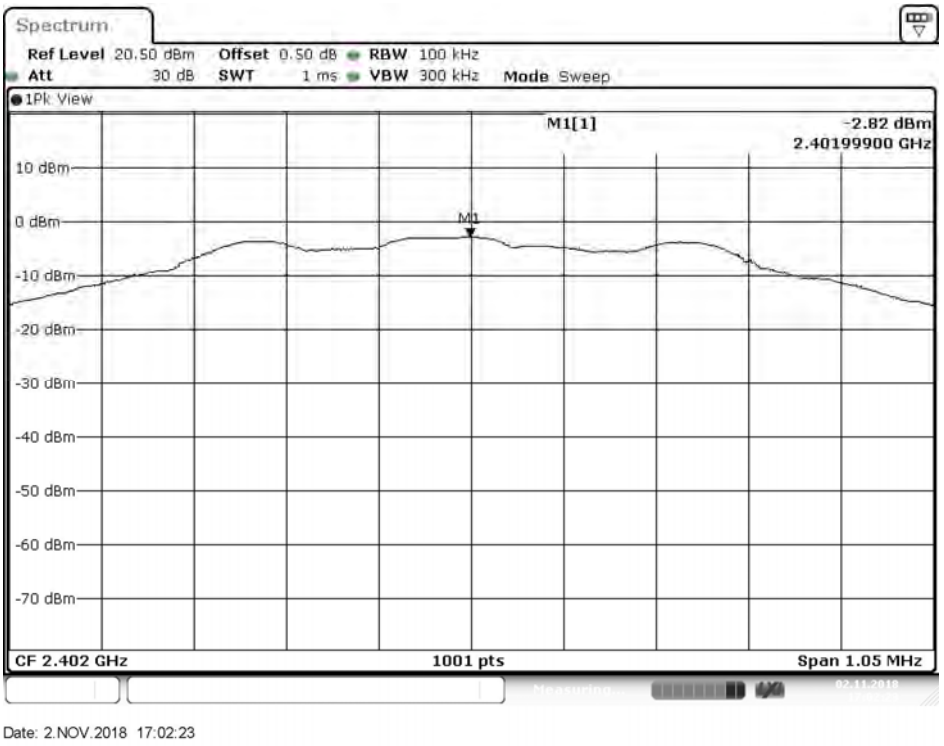
±1.23dB

8.5. Test Result of Power Density

Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
00	2402	-2.82	≦8dBm	Pass

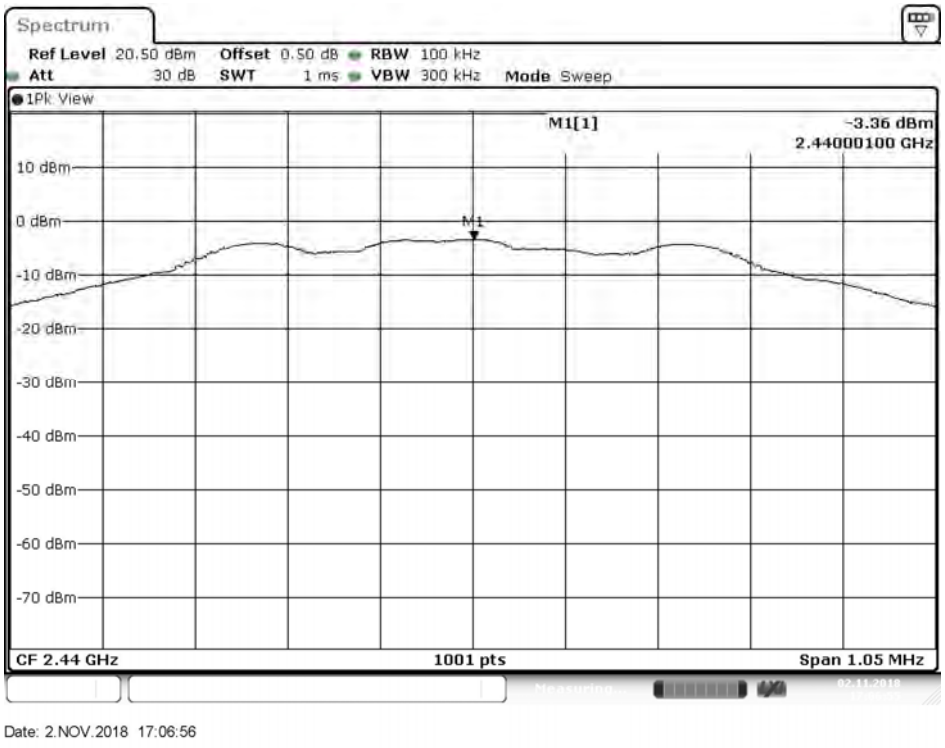
Figure Channel 00:



Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
19	2440	-3.36	≦8dBm	Pass

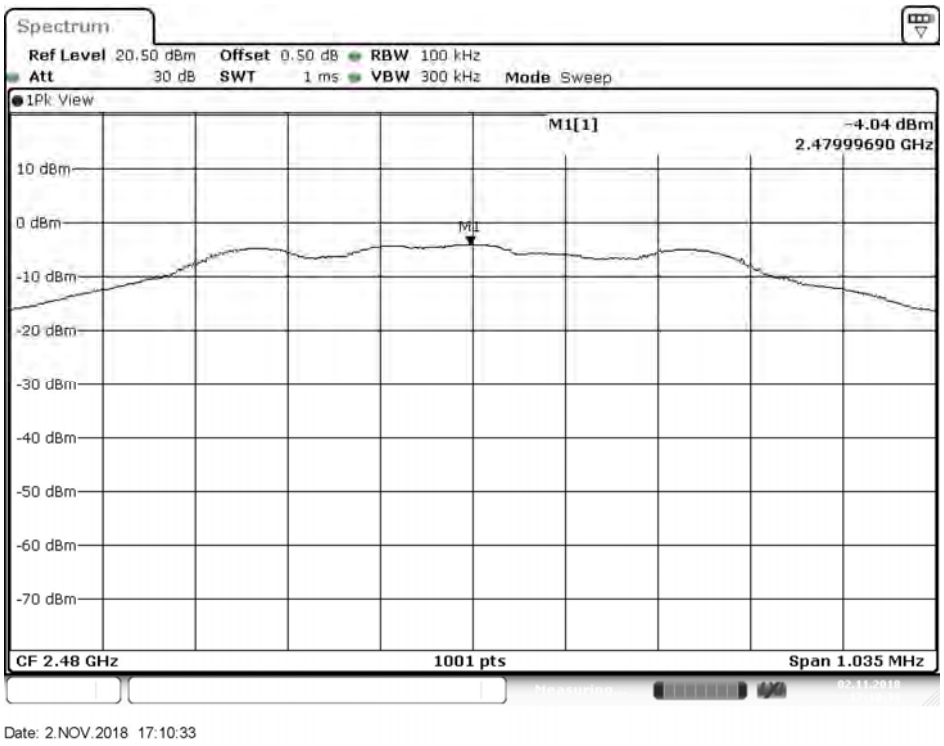
Figure Channel 19:



Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Power Density Data
Test Mode : Mode 1: Transmit - BLE (2480MHz)

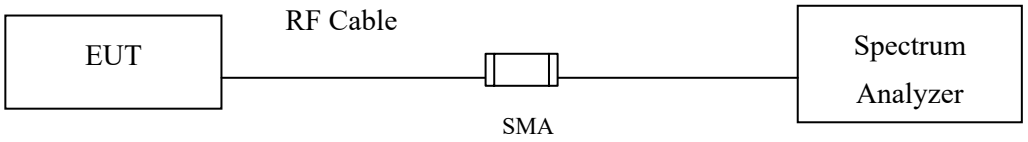
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	-4.04	≦8dBm	Pass

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

± 2.31msec

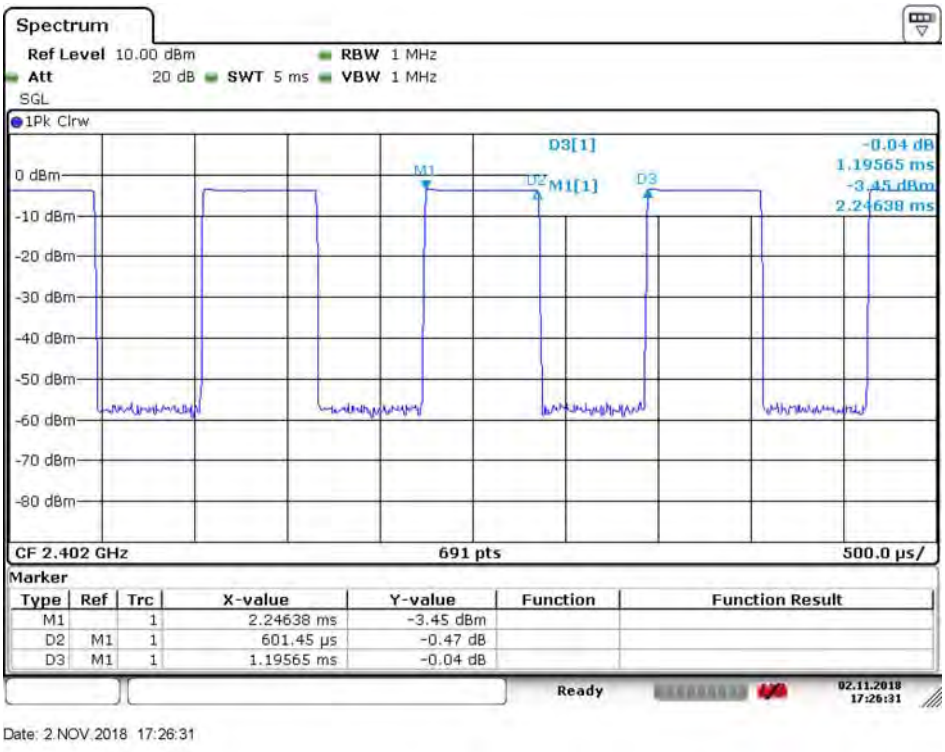
9.4. Test Result of Duty Cycle

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

Duty Cycle Formula:
Duty Cycle = Ton / (Ton + Toff)
Duty Factor = 10 Log (1/Duty Cycle)

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.6014	1.1956	50.30	2.98



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.