

FCC Test Report

Product Name	Automatic Upper Arm Blood Pressure Monitor
Model No.	HL858CJ
FCC ID.	2ABTAHNL85CJ

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

Date of Receipt	Mar. 26, 2019
Issued Date	May 10, 2019
Report No.	1930421R-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: May 10, 2019

Report No.: 1930421R-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.
Model No.	HL858CJ
FCC ID.	2ABTAHNL85CJ
EUT Rated Voltage	AC 100-240V~47-63Hz ; By Battery DC 6V
EUT Test Voltage	AC 120V/ 60Hz
Trade Name	Health & Life
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2018 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v05
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Genie Chang)

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.	HL858CJ
FCC ID.	2ABTAHNL85CJ
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 In Put: AC100-240V~47-63Hz 0.4~0.2A Out Put: 5.99V, 2A Cable Out: Non-shielded, 1.65m, 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 2.4GHz

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 an Automatic Upper Arm Blood Pressure Monitor with a built-in Bluetooth V4.0 transceiver.
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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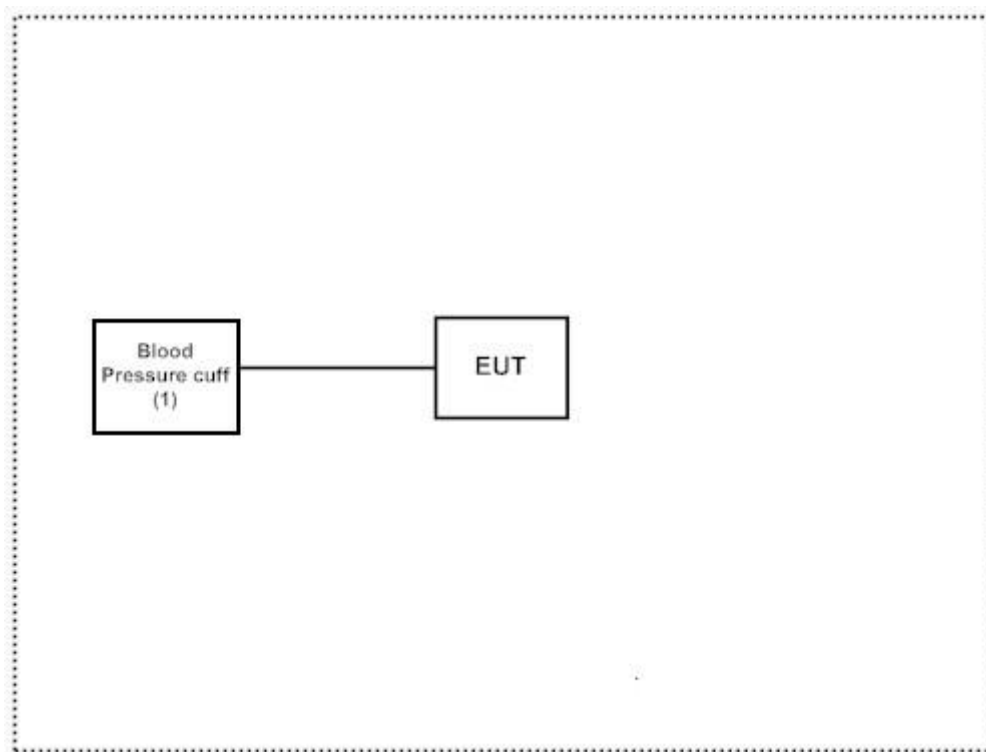
1.3. Tested System Details

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 Blood Pressure cuff	Health	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A Tube Cable	Non-shielded, 0.6m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Provide the AC Power Source.
3. Configure the test mode, and test channel.
4. Start transmits continually.
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	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	2019/02/26	2020/02/25
X	Spectrum Analyzer	Agilent	N9010A	MY48030495	2018/09/27	2019/09/26
X	Power Meter	Anritsu	ML2495A	6K00003357	2018/08/01	2019/07/31
X	Pulse power sensor	Anritsu	MA2411B	0846193	2018/07/25	2019/07/24
X	EMI Test Receiver	R&S	ESCS 30	100369	2018/07/25	2019/07/24
X	LISN	R&S	ESH3-Z5	836679/017	2018/11/19	2019/11/18
X	LISN	R&S	ENV216	100097	2019/04/10	2020/04/09
X	Coaxial Cable	QTK(Armist)	RG 400	LC018-RG	2019/04/02	2020/04/01

For Radiated measurements /Site3/CB8

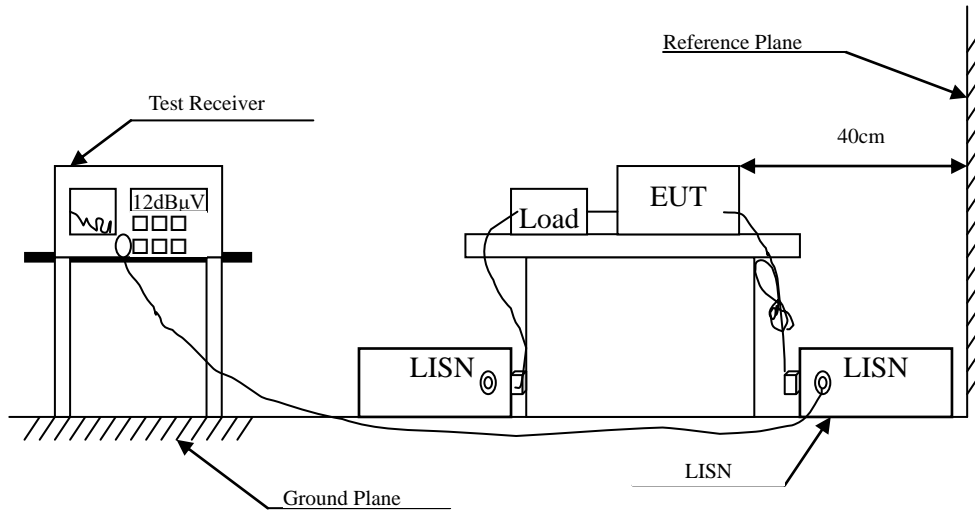
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2019/03/12	2020/03/11
X	Loop Antenna	Teseq	HLA6121	37133	2017/10/13	2019/10/12
X	Bilog Antenna	Schaffner Chase	CBL6112B	2707	2018/06/24	2019/06/23
X	Coaxial Cable	DEKRA	RG 214	LC003-RG	2018/06/14	2019/06/13
X	Pre-Amplifier	Jet-Power	JPA-10M1G33	170101000330010	2018/06/14	2019/06/13
X	<u>Horn Antenna</u>	ETS-Lindgren	3117	00135205	2019/05/03	2020/05/02
X	<u>Horn Antenna</u>	SCHWARZBECK	9120D	576	2018/12/18	2019/12/17
X	<u>Pre-Amplifier</u>	EMCI	EMC012630SE	980210	2019/04/10	2020/04/09
X	Horn Antenna	Com-Power	AH-840	101043	2019/01/19	2020/01/18
X	Amplifier + Cable	EMCI	EMC184045SE	980370	2019/03/27	2020/03/26
X	Filter	MICRO-TRONICS	BRM50702	G270	2018/08/06	2019/08/05
X	Filter	MICRO-TRONICS	BRM50716	G196	2018/08/06	2019/08/05

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 : QuiTek 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.

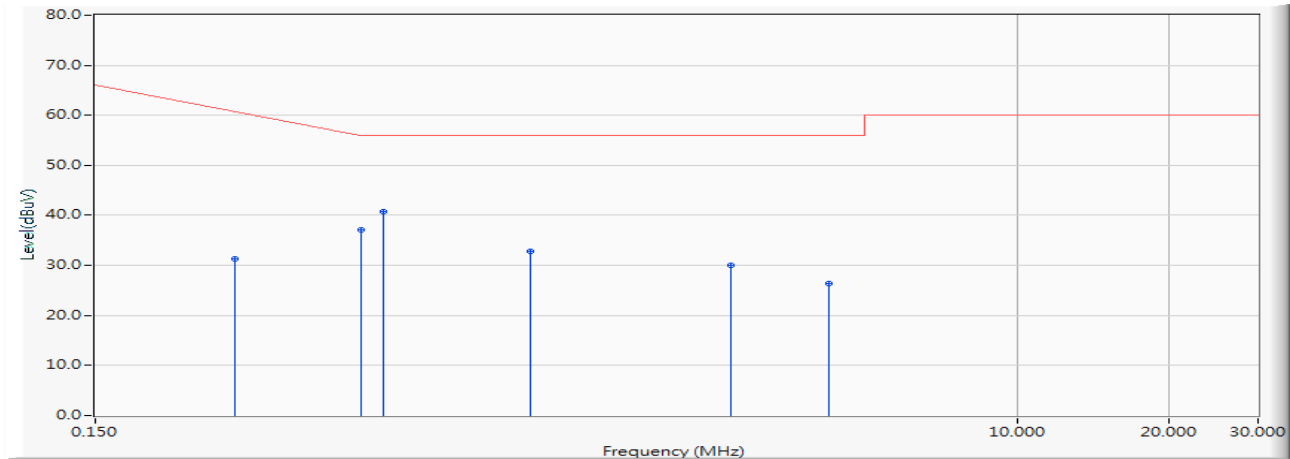
2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Test date : 2019/04/23
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line1



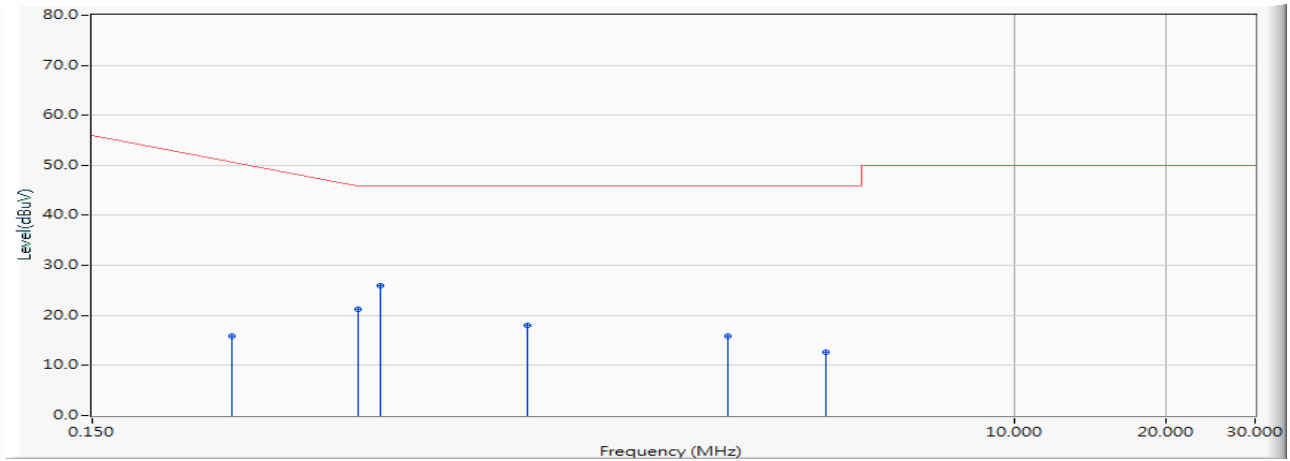
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.283	9.661	21.600	31.261	-30.939	62.200	QUASIPeAK
2		0.502	9.670	27.420	37.090	-18.910	56.000	QUASIPeAK
3	*	0.556	9.672	31.160	40.832	-15.168	56.000	QUASIPeAK
4		1.087	9.694	23.160	32.854	-23.146	56.000	QUASIPeAK
5		2.724	9.762	20.260	30.022	-25.978	56.000	QUASIPeAK
6		4.244	9.806	16.580	26.386	-29.614	56.000	QUASIPeAK

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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Test date : 2019/04/23
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line1



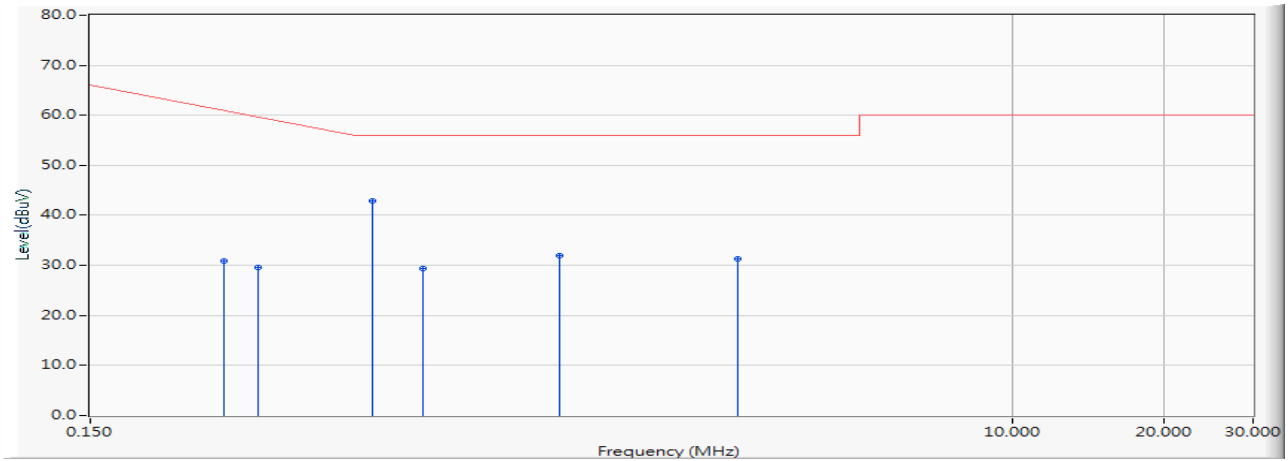
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.283	9.661	6.310	15.971	-36.229	52.200	AVERAGE
2		0.502	9.670	11.560	21.230	-24.770	46.000	AVERAGE
3	*	0.556	9.672	16.380	26.052	-19.948	46.000	AVERAGE
4		1.087	9.694	8.300	17.994	-28.006	46.000	AVERAGE
5		2.724	9.762	6.130	15.892	-30.108	46.000	AVERAGE
6		4.244	9.806	2.930	12.736	-33.264	46.000	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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Test date : 2019/04/23
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line2



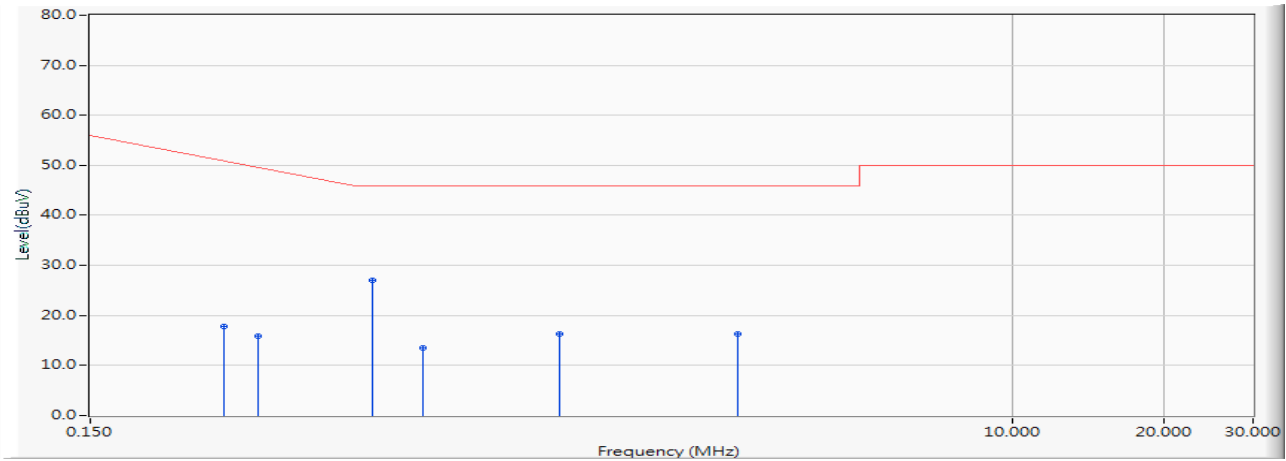
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.275	9.691	21.220	30.911	-31.518	62.429	QUASIPeAK
2		0.322	9.693	19.960	29.653	-31.433	61.086	QUASIPeAK
3	*	0.541	9.702	33.120	42.822	-13.178	56.000	QUASIPeAK
4		0.681	9.708	19.600	29.308	-26.692	56.000	QUASIPeAK
5		1.271	9.742	22.140	31.882	-24.118	56.000	QUASIPeAK
6		2.865	9.805	21.560	31.365	-24.635	56.000	QUASIPeAK

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

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Conducted Emission Test
 Test date : 2019/04/23
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Line2



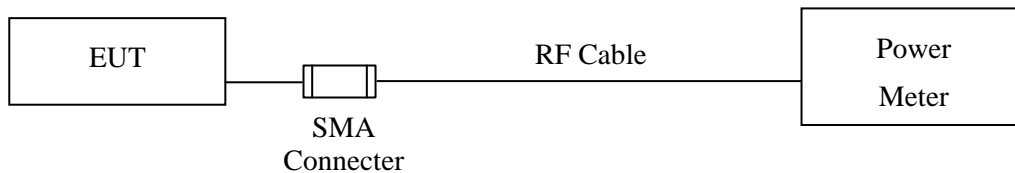
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.275	9.691	8.090	17.781	-34.648	52.429	AVERAGE
2		0.322	9.693	6.130	15.823	-35.263	51.086	AVERAGE
3	*	0.541	9.702	17.250	26.952	-19.048	46.000	AVERAGE
4		0.681	9.708	3.840	13.548	-32.452	46.000	AVERAGE
5		1.271	9.742	6.480	16.222	-29.778	46.000	AVERAGE
6		2.865	9.805	6.390	16.195	-29.805	46.000	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

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

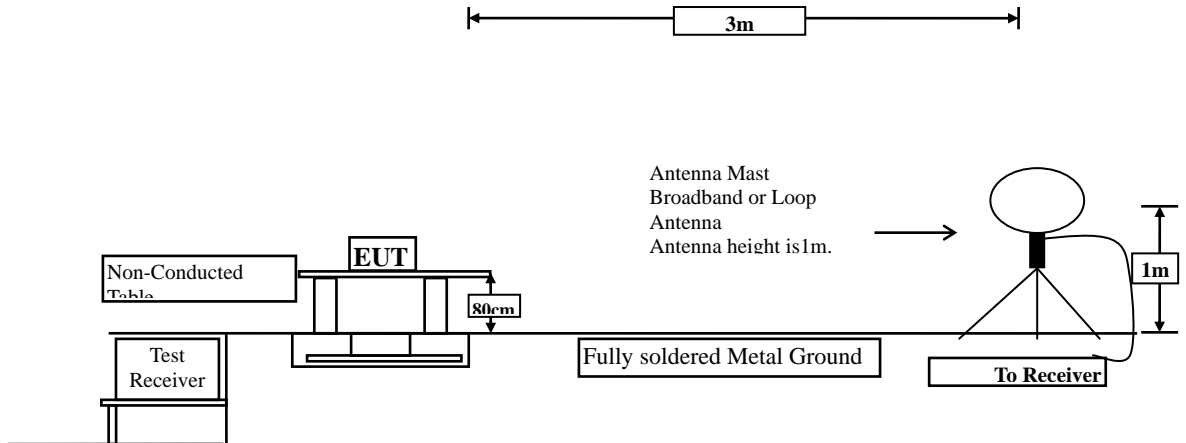
Product : Automatic Upper Arm Blood Pressure Monitor
Test Item : Peak Power Output
Test Site : No.3 OATS
Test date : 2019/03/27
Test Mode : Mode 1: Transmit - BLE (GFSK)

Channel No.	Frequency (MHz)	Peak Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	1.63	1 Watt= 30 dBm	Pass
Channel 19	2440.00	1.21	1 Watt= 30 dBm	Pass
Channel 39	2480.00	0.38	1 Watt= 30 dBm	Pass

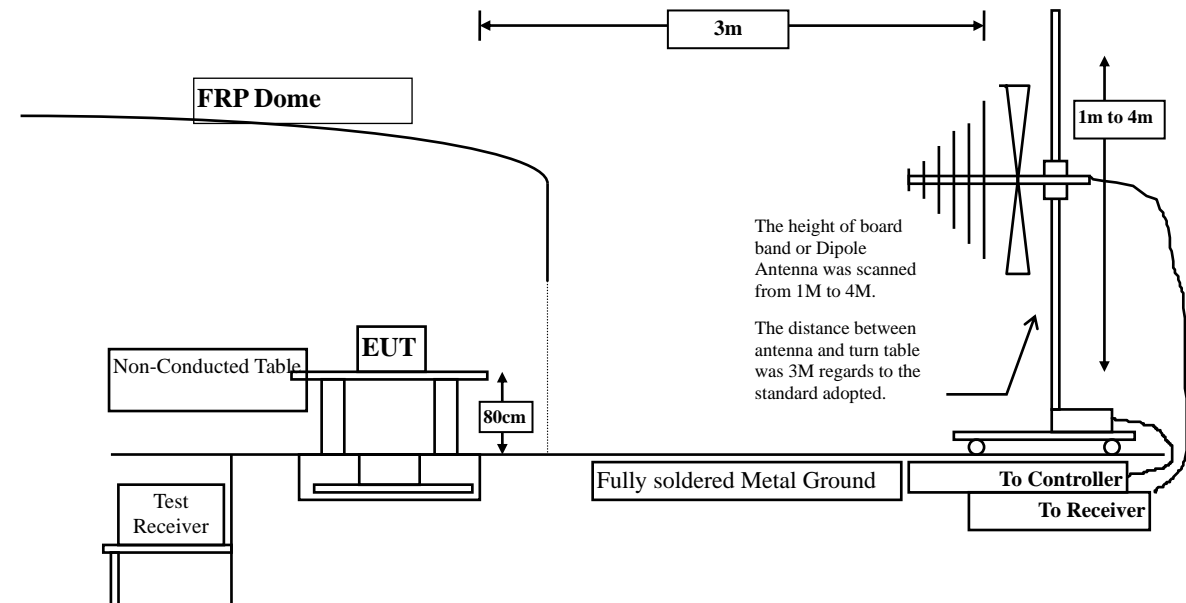
4. Radiated Emission

4.1. Test Setup

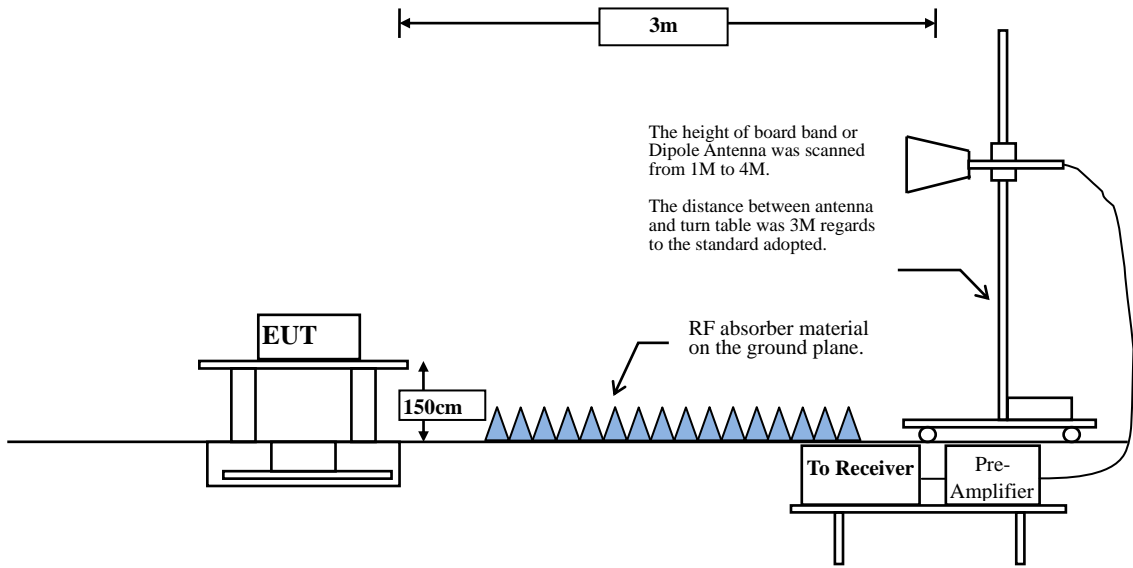
Under 30MHz



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	85.11	0.6000	1667	2k

Note: Duty Cycle Refer to Section 9

4.4. Uncertainty

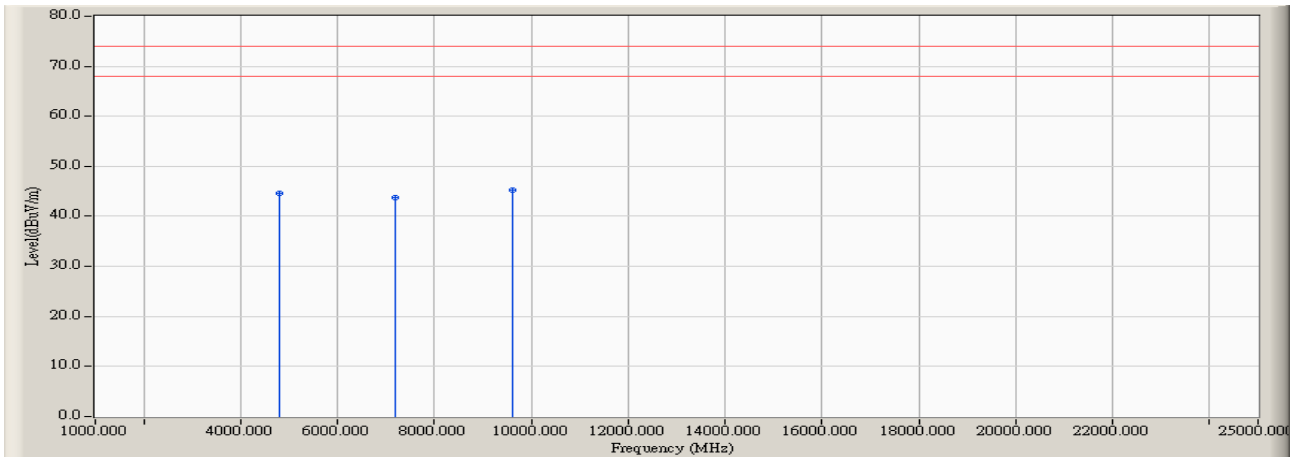
± 4.08 dB above 1GHz

± 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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK)(2402MHz)

Horizontal



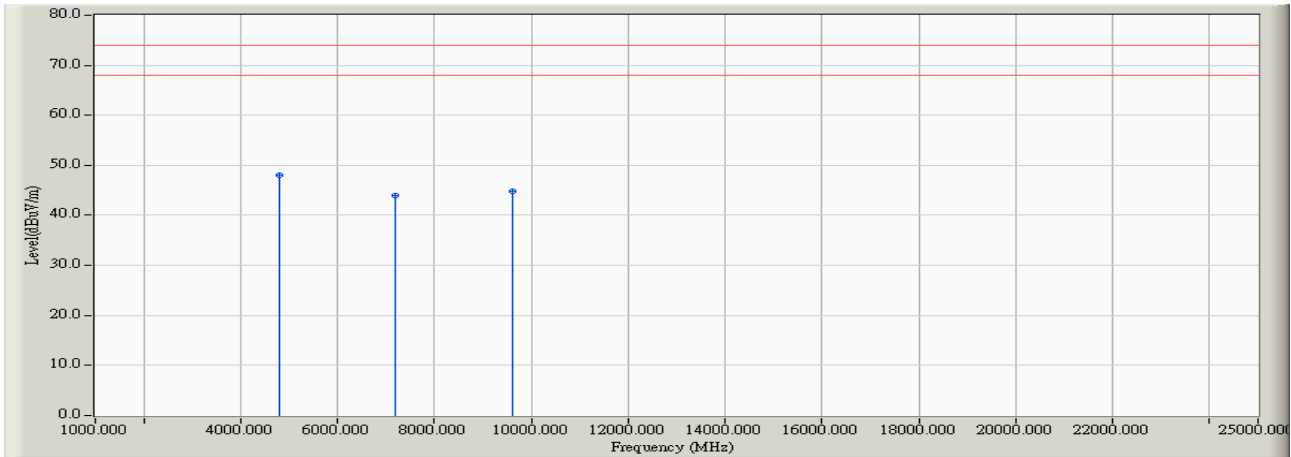
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	4804.000	-3.486	48.050	44.564	-29.436	74.000	PEAK
2	7206.000	-0.642	44.390	43.748	-30.252	74.000	PEAK
3	* 9608.000	0.590	44.620	45.210	-28.790	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK)(2402MHz)

Vertical



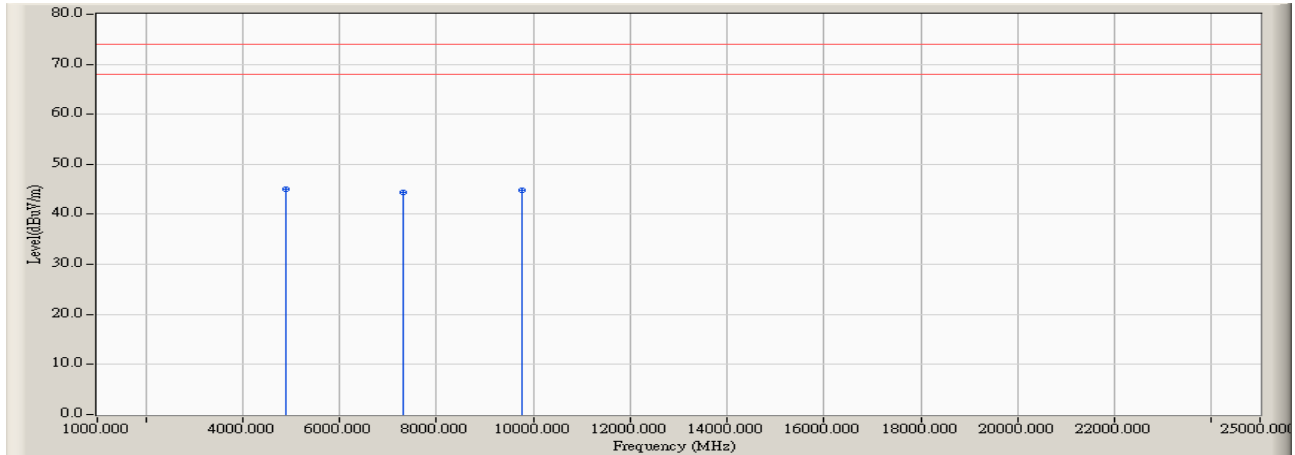
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4804.000	-3.486	51.460	47.974	-26.026	74.000	PEAK
2		7206.000	-0.642	44.580	43.938	-30.062	74.000	PEAK
3		9608.000	0.590	44.290	44.880	-29.120	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Horizontal



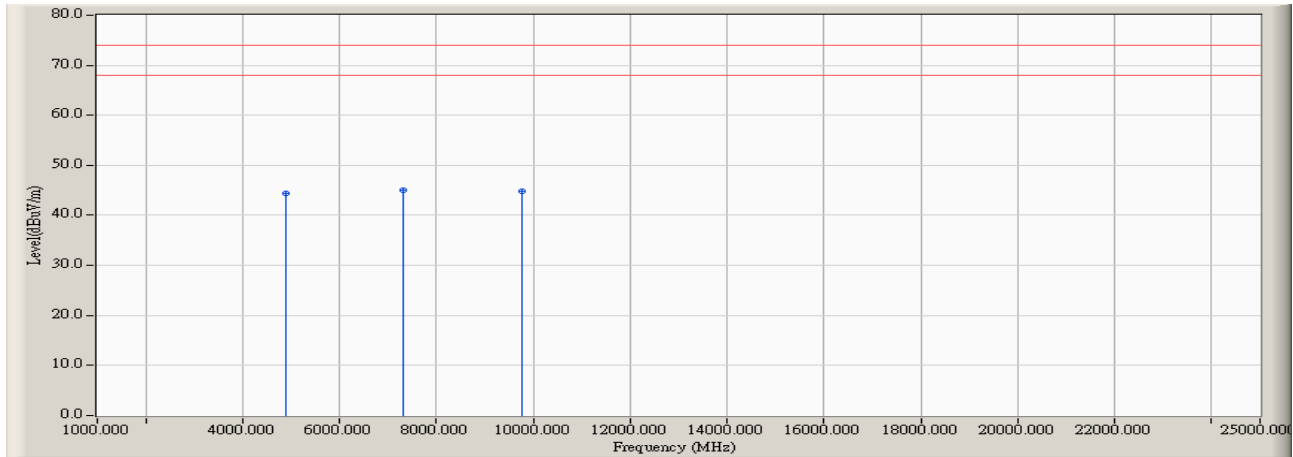
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	4882.000	-3.430	48.390	44.960	-29.040	74.000	PEAK
2		7323.000	-0.796	45.250	44.454	-29.546	74.000	PEAK
3		9764.000	0.829	43.950	44.779	-29.221	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Vertical



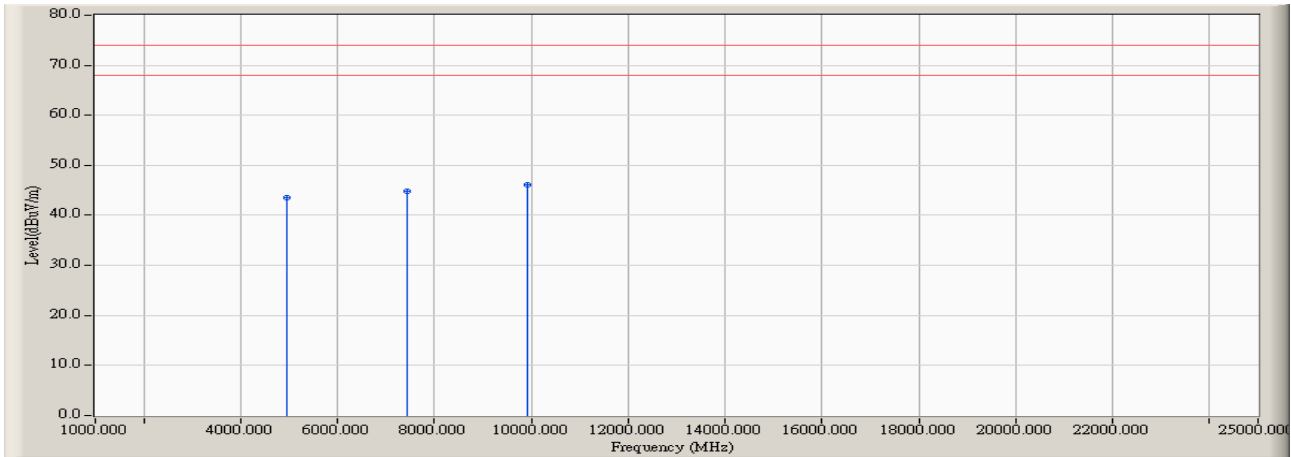
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4882.000	-3.430	47.850	44.420	-29.580	74.000	PEAK
2	*	7323.000	-0.796	45.810	45.014	-28.986	74.000	PEAK
3		9764.000	0.829	43.970	44.799	-29.201	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Horizontal



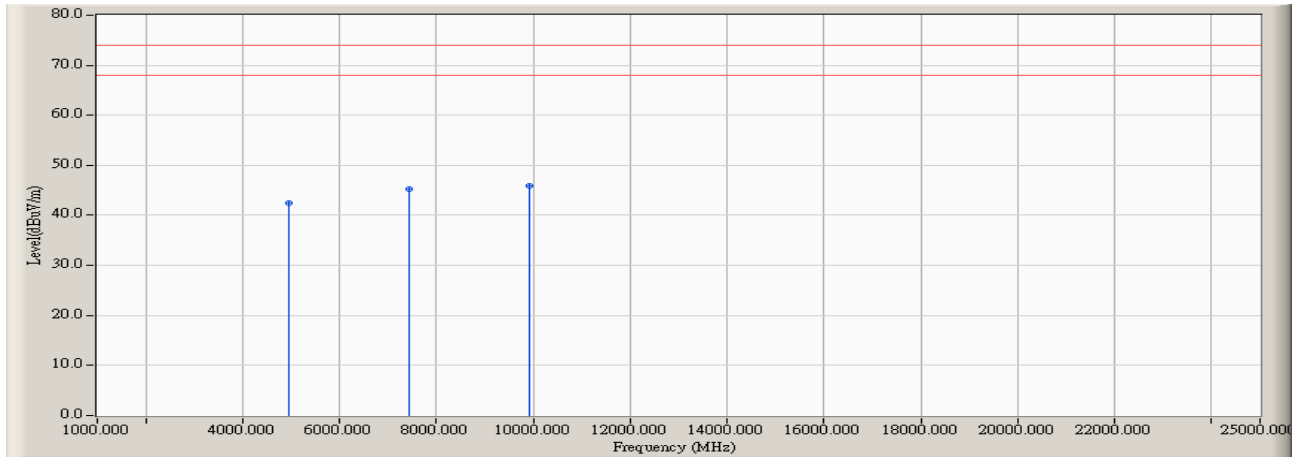
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4960.000	-3.376	46.910	43.534	-30.466	74.000	PEAK
2		7440.000	-0.661	45.390	44.729	-29.271	74.000	PEAK
3	*	9920.000	1.155	45.050	46.205	-27.795	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Vertical



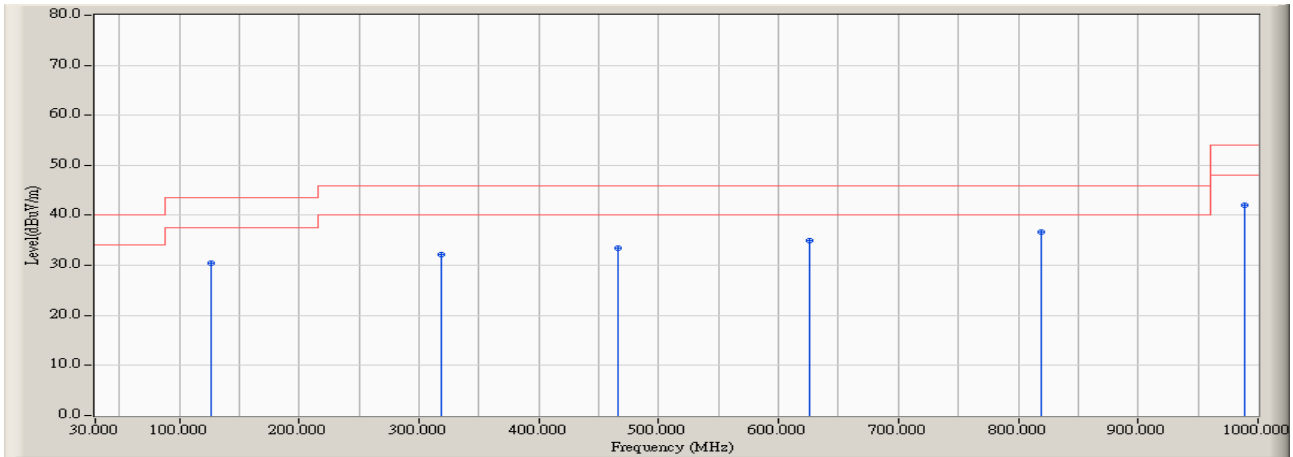
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4960.000	-3.376	45.930	42.554	-31.446	74.000	PEAK
2		7440.000	-0.661	45.870	45.209	-28.791	74.000	PEAK
3	*	9920.000	1.155	44.720	45.875	-28.125	74.000	PEAK

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 : 2019/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Horizontal



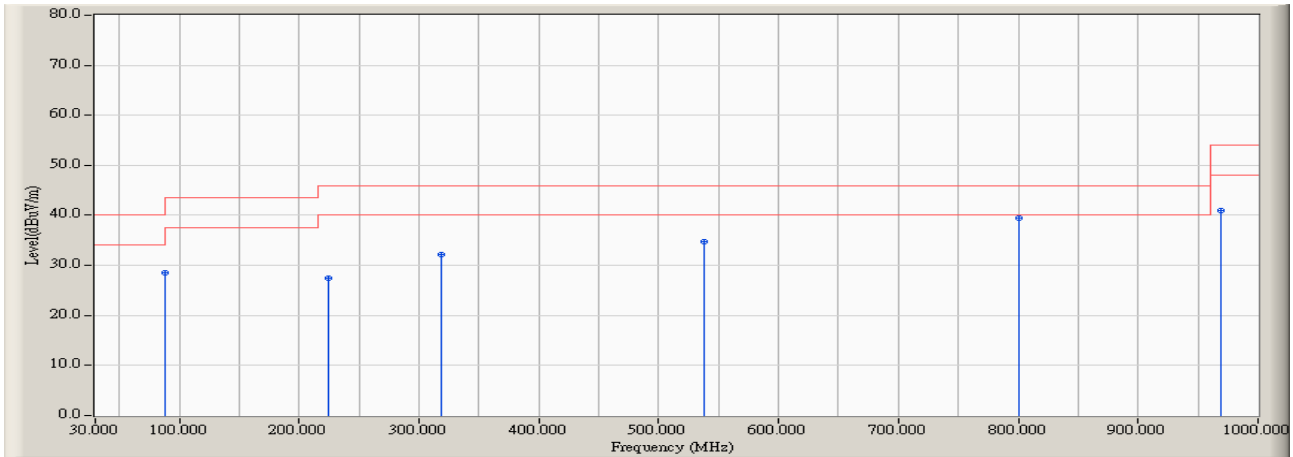
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	127.000	19.708	10.820	30.528	-12.972	43.500	QUASPEAK
2	319.060	22.304	9.823	32.127	-13.873	46.000	QUASPEAK
3	466.500	25.732	7.763	33.495	-12.505	46.000	QUASPEAK
4	625.580	28.150	6.868	35.018	-10.982	46.000	QUASPEAK
5	* 819.580	29.988	6.667	36.655	-9.345	46.000	QUASPEAK
6	988.360	31.893	10.042	41.935	-12.065	54.000	QUASPEAK

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.

Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test date : 2019/04/17
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2440MHz)

Vertical



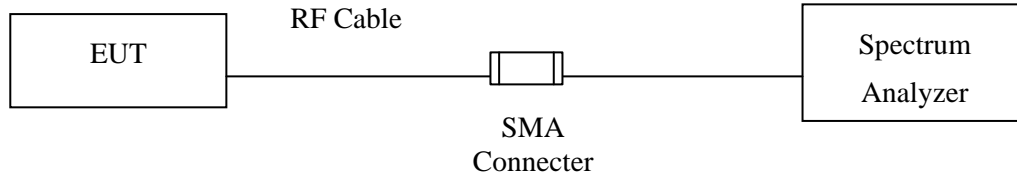
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	88.200	16.029	12.469	28.498	-15.002	43.500	QUASIPeAK
2	224.000	18.506	8.938	27.444	-18.556	46.000	QUASIPeAK
3	319.060	22.304	9.867	32.171	-13.829	46.000	QUASIPeAK
4	538.280	27.034	7.762	34.796	-11.204	46.000	QUASIPeAK
5	* 800.180	29.646	9.869	39.515	-6.485	46.000	QUASIPeAK
6	968.960	31.740	9.170	40.910	-13.090	54.000	QUASIPeAK

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 : 2019/03/27
Test Mode : Mode 1: Transmit - BLE (GFSK)

Figure Channel 00:

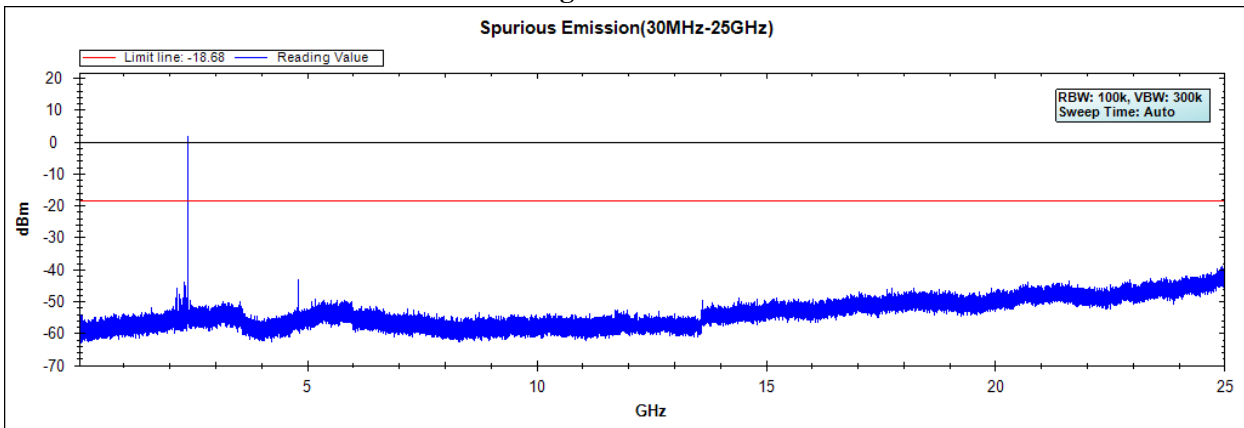


Figure Channel 19:

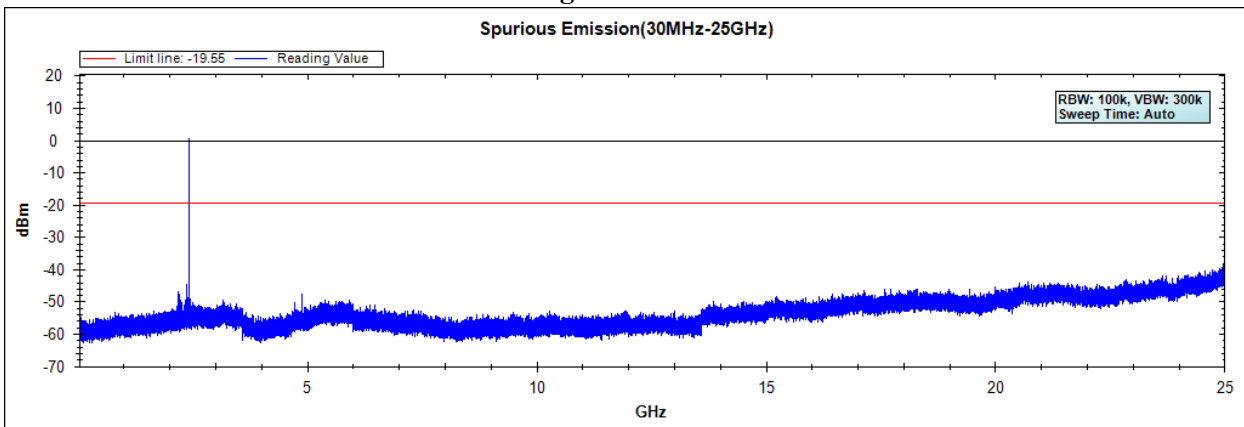
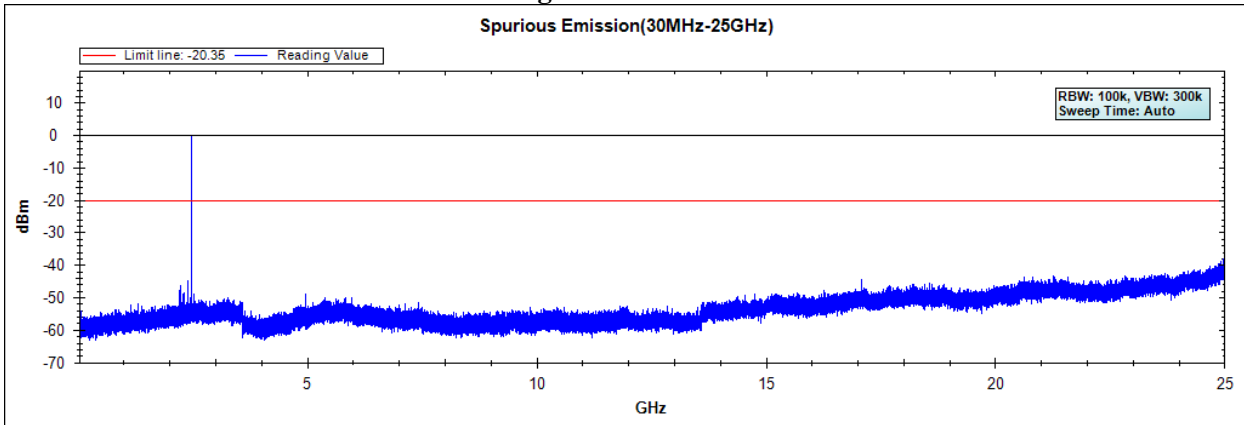


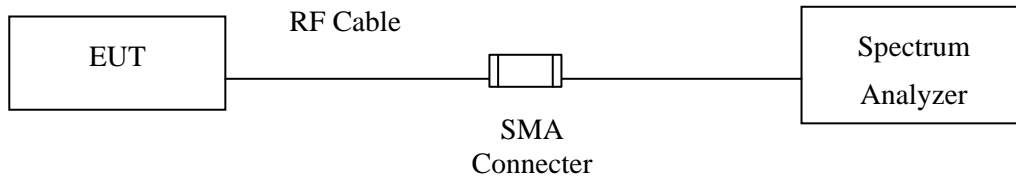
Figure Channel 39:



6. Band Edge

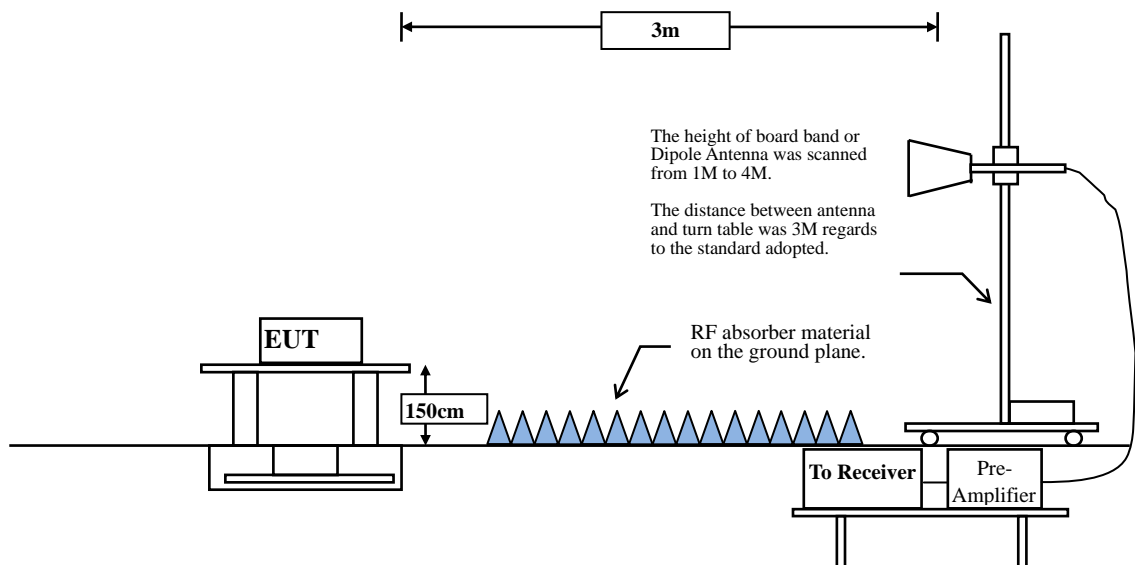
6.1. Test Setup

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	85.11	0.6000	1667	2k

Note: Duty Cycle Refer to Section 9

6.4. Uncertainty

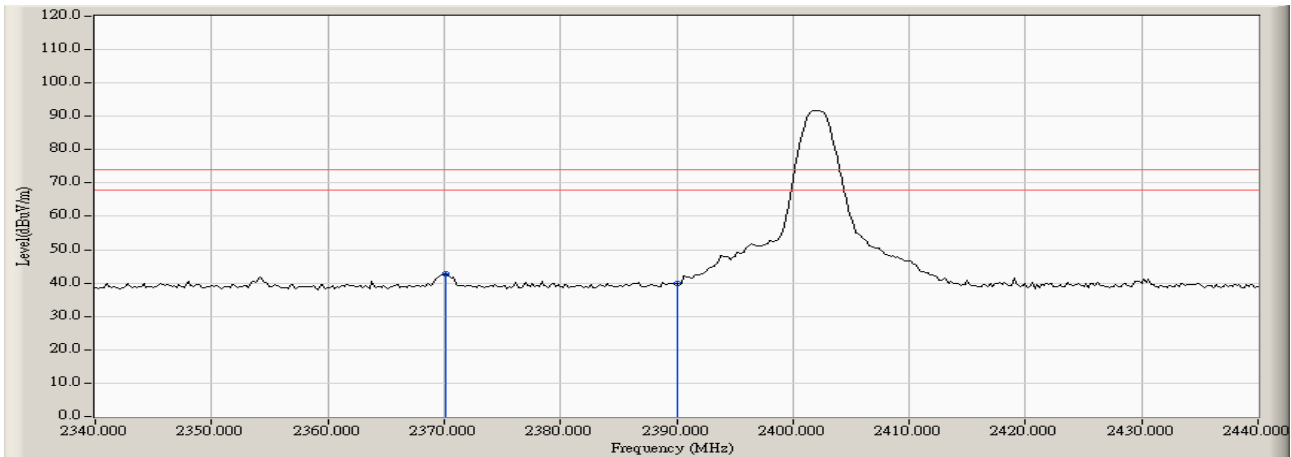
± 4.08 dB above 1GHz

± 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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Horizontal



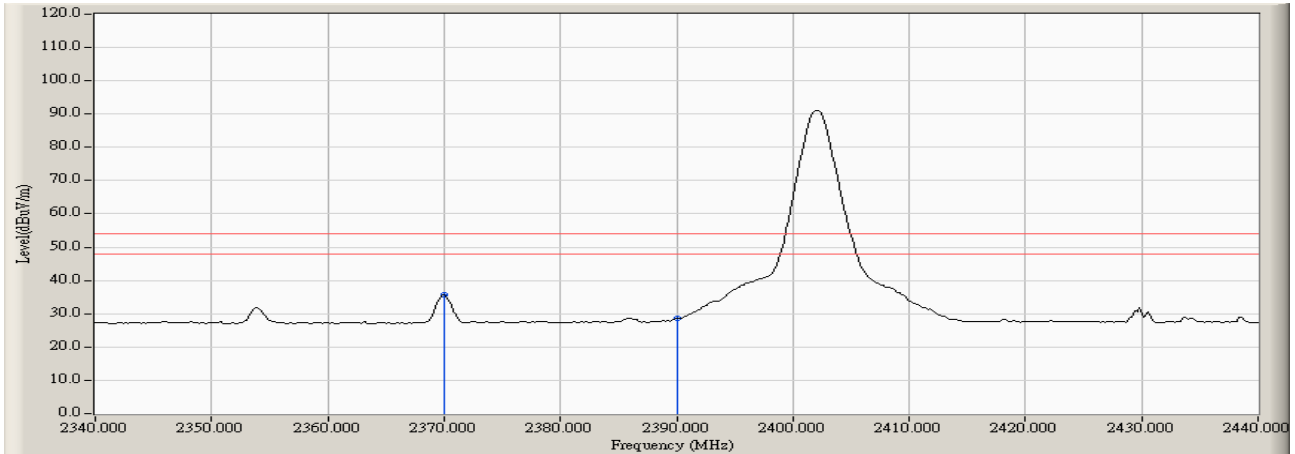
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2370.200	-8.526	51.159	42.633	-31.367	74.000	PEAK
2	2390.000	-8.421	48.299	39.877	-34.123	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Horizontal



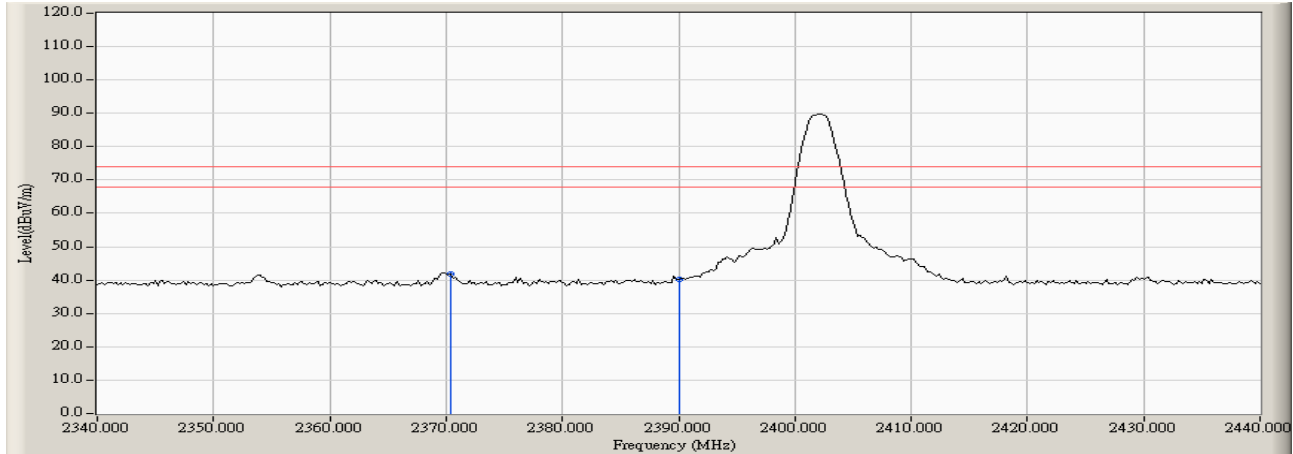
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2370.000	-8.527	44.168	35.641	-18.359	54.000	AVERAGE
2	2390.000	-8.421	36.929	28.507	-25.493	54.000	AVERAGE

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Vertical



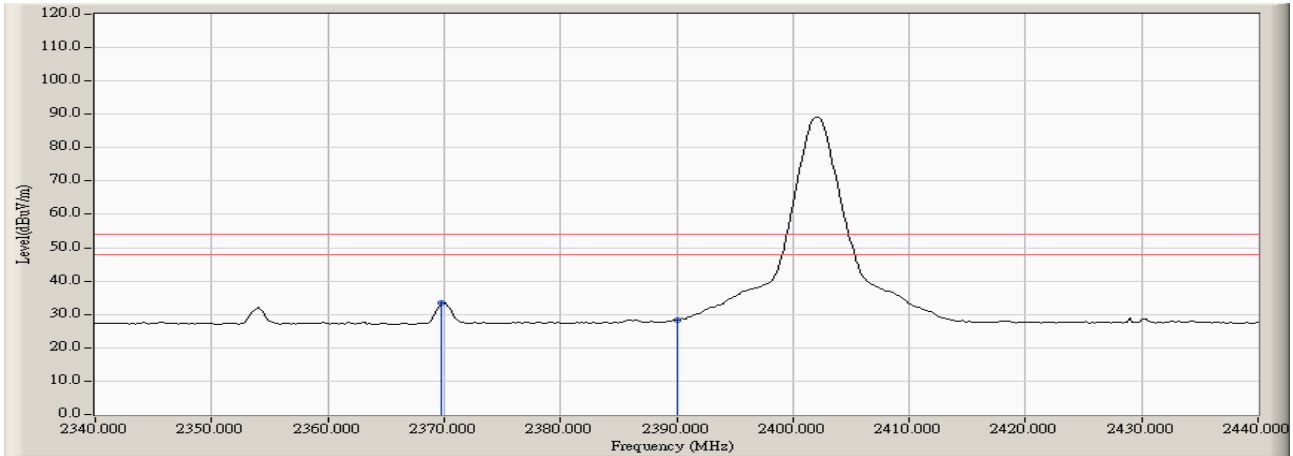
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2370.400	-8.525	50.386	41.861	-32.139	74.000	PEAK
2	2390.000	-8.421	48.549	40.127	-33.873	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Vertical



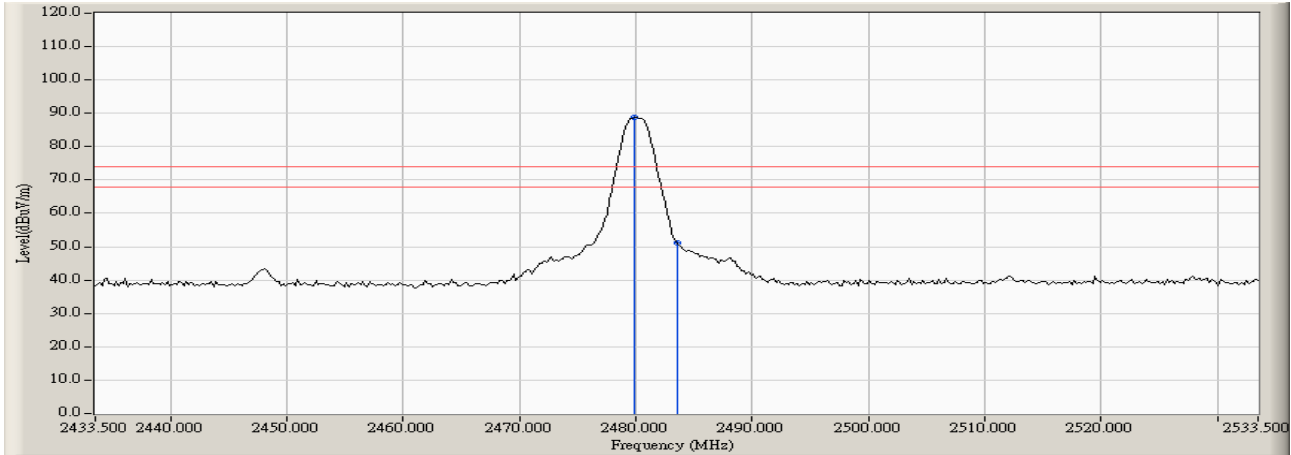
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2369.800	-8.528	42.029	33.501	-20.499	54.000	AVERAGE
2	2390.000	-8.421	36.729	28.307	-25.693	54.000	AVERAGE

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Horizontal



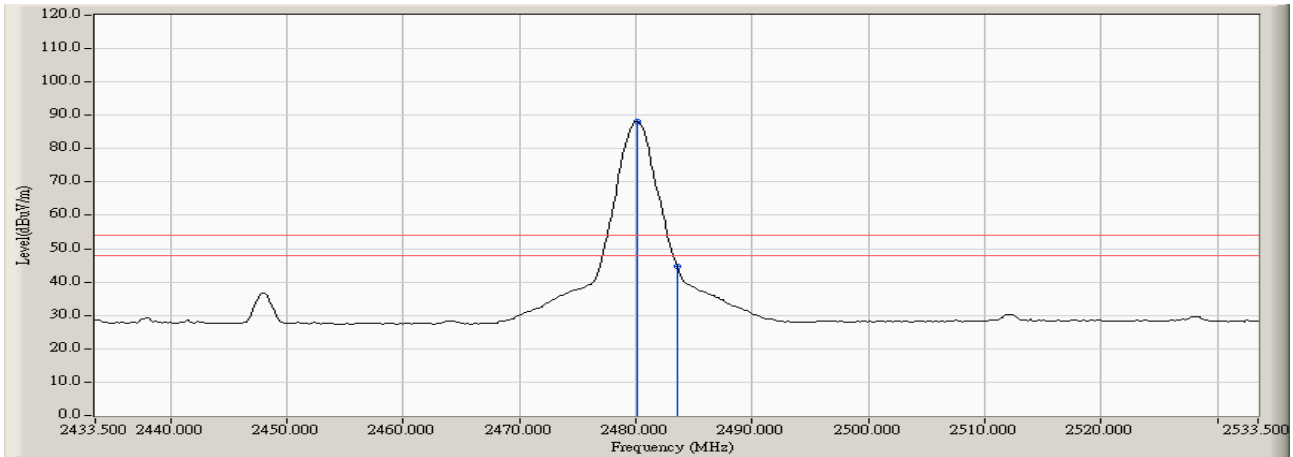
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.900	-8.218	96.909	88.691	14.691	74.000	PEAK
2		2483.500	-8.214	59.335	51.121	-22.879	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Horizontal



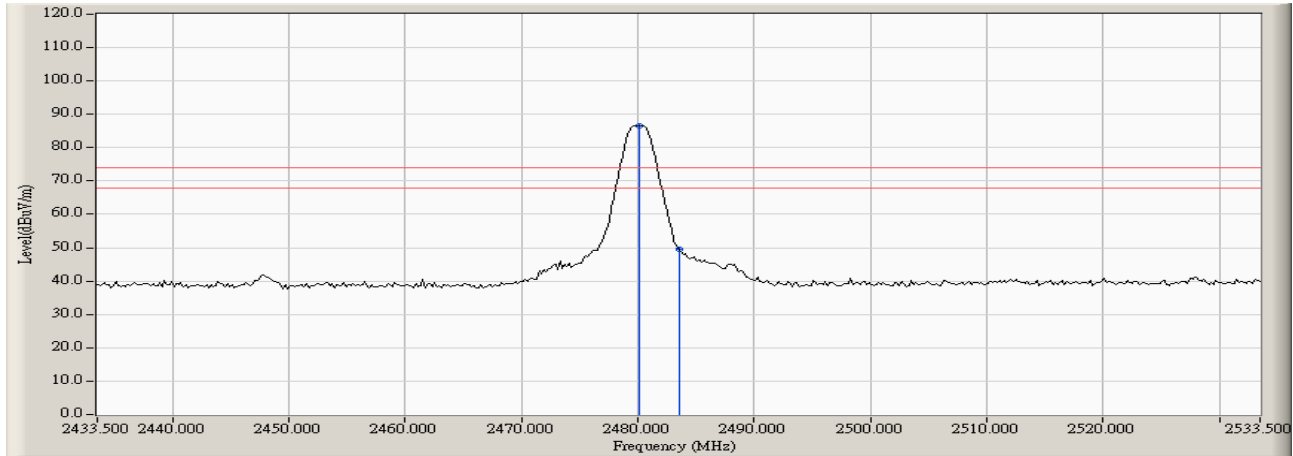
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2480.100	-8.217	96.444	88.226	34.226	54.000	AVERAGE
2		2483.500	-8.214	53.034	44.820	-9.180	54.000	AVERAGE

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Vertical



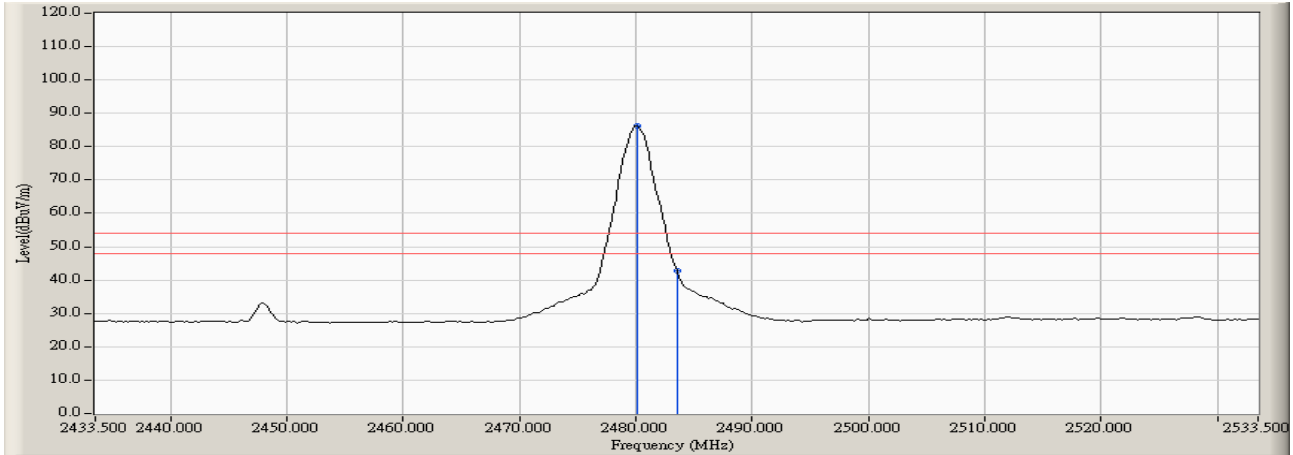
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2480.100	-8.217	94.838	86.620	12.620	74.000	PEAK
2		2483.500	-8.214	57.614	49.400	-24.600	74.000	PEAK

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 : 2019/05/08
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2480.100	-8.217	94.388	86.170	32.170	54.000	AVERAGE
2		2483.500	-8.214	50.952	42.738	-11.262	54.000	AVERAGE

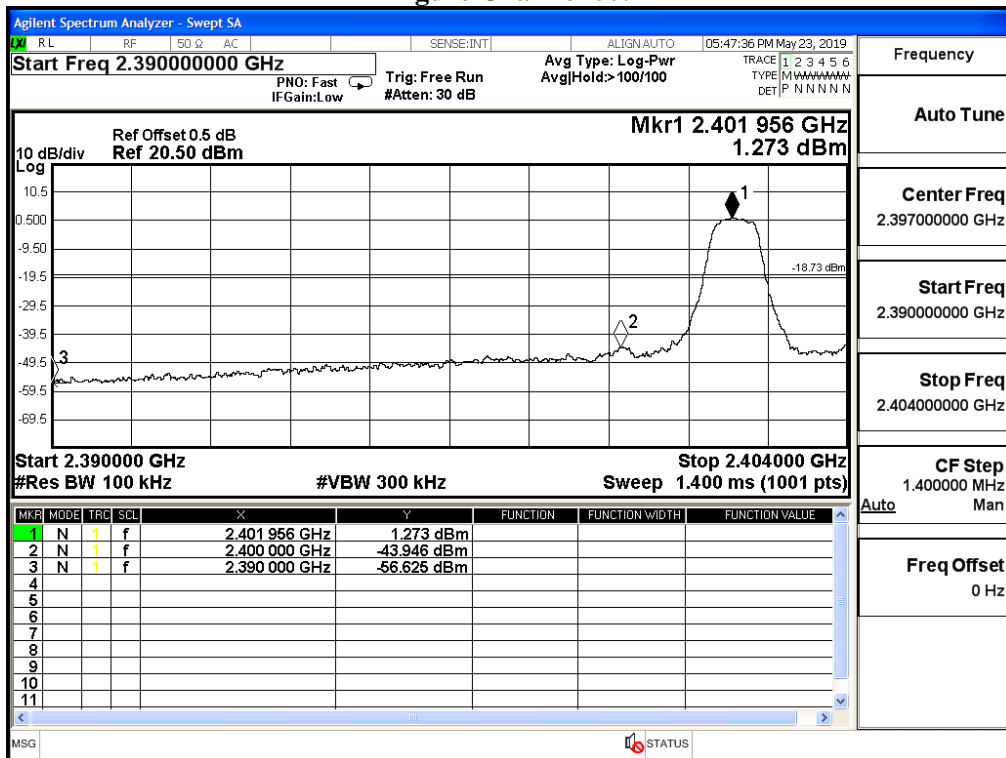
Note:

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 : 2019/05/24
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2402MHz)

Measurement Level	Result
Δ (dB)	
> 20	PASS

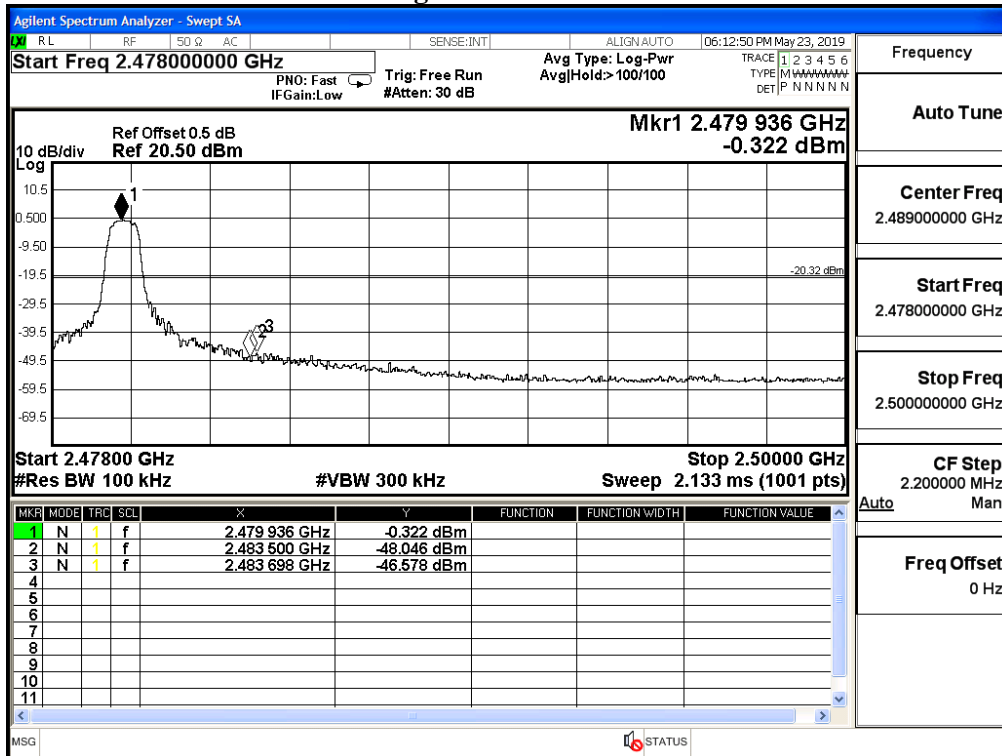
Figure Channel 00:



Product : Automatic Upper Arm Blood Pressure Monitor
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test date : 2019/05/24
 Test Mode : Mode 1: Transmit - BLE (GFSK) (2480MHz)

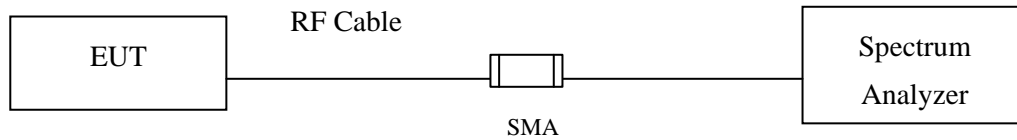
Measurement Level	Result
Δ (dB)	
> 20	PASS

Figure Channel 00:



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, $VBW \geq 3 * RBW$

7.4. Uncertainty

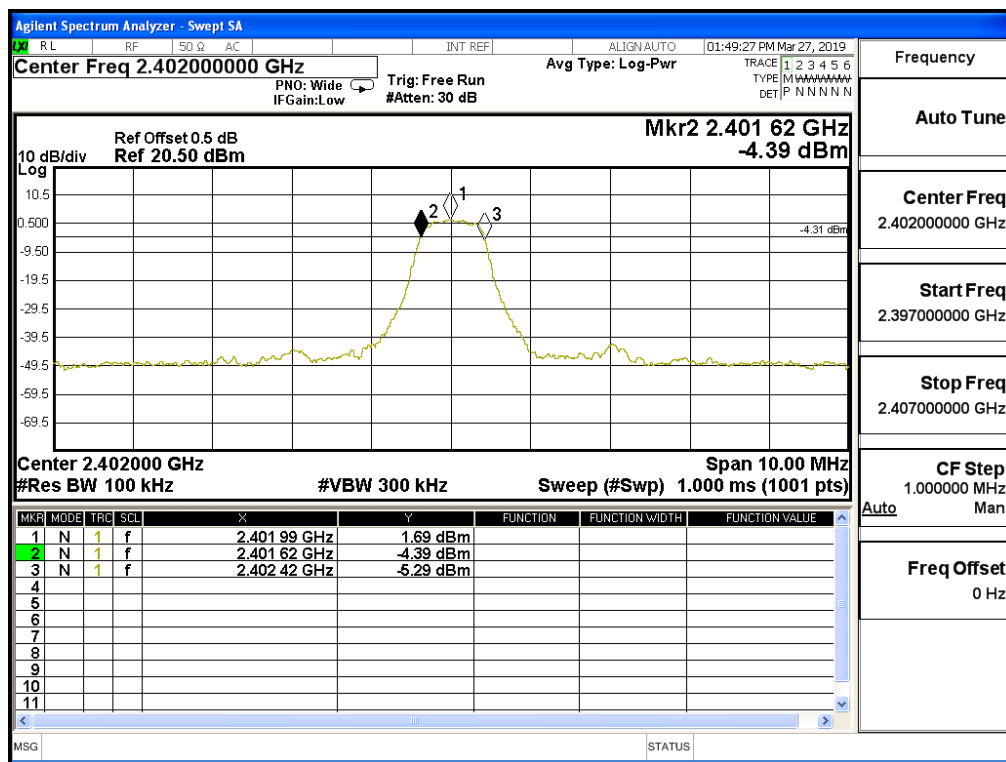
$\pm 283\text{Hz}$

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

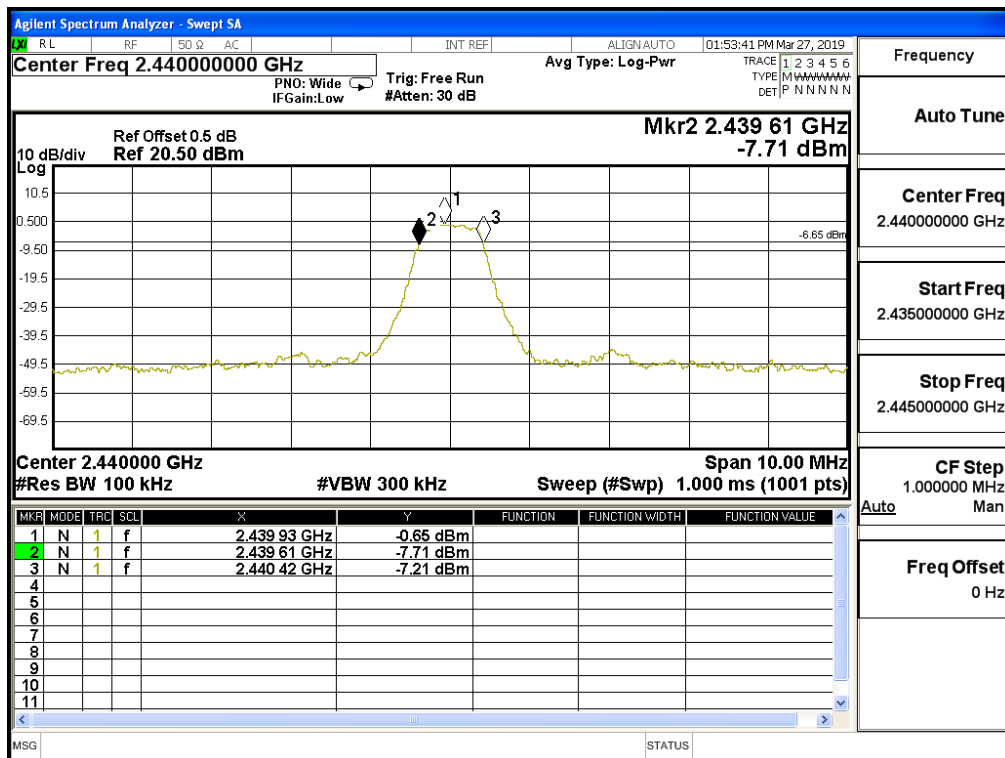
Figure Channel 00:



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

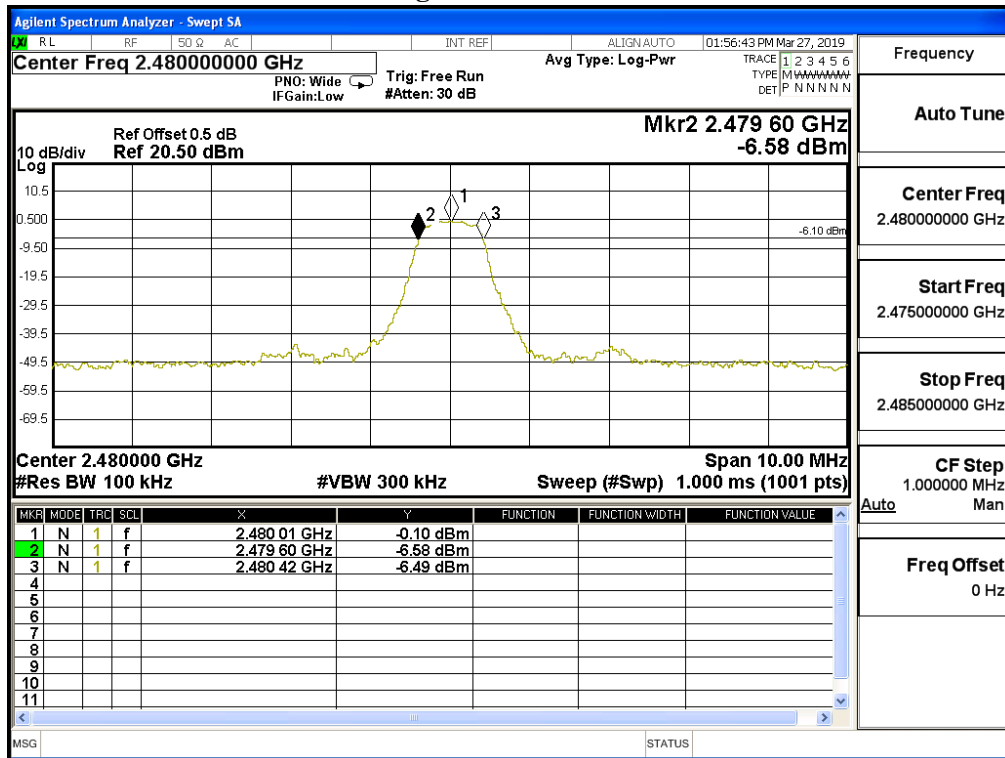
Figure Channel 19:



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)

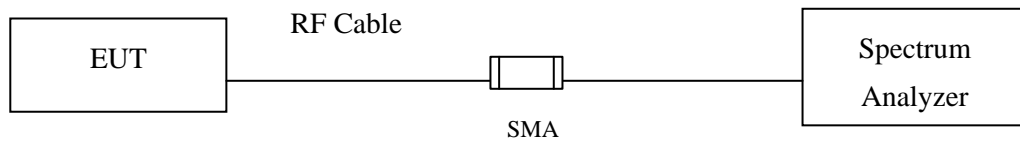
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2480	820	>500	Pass

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

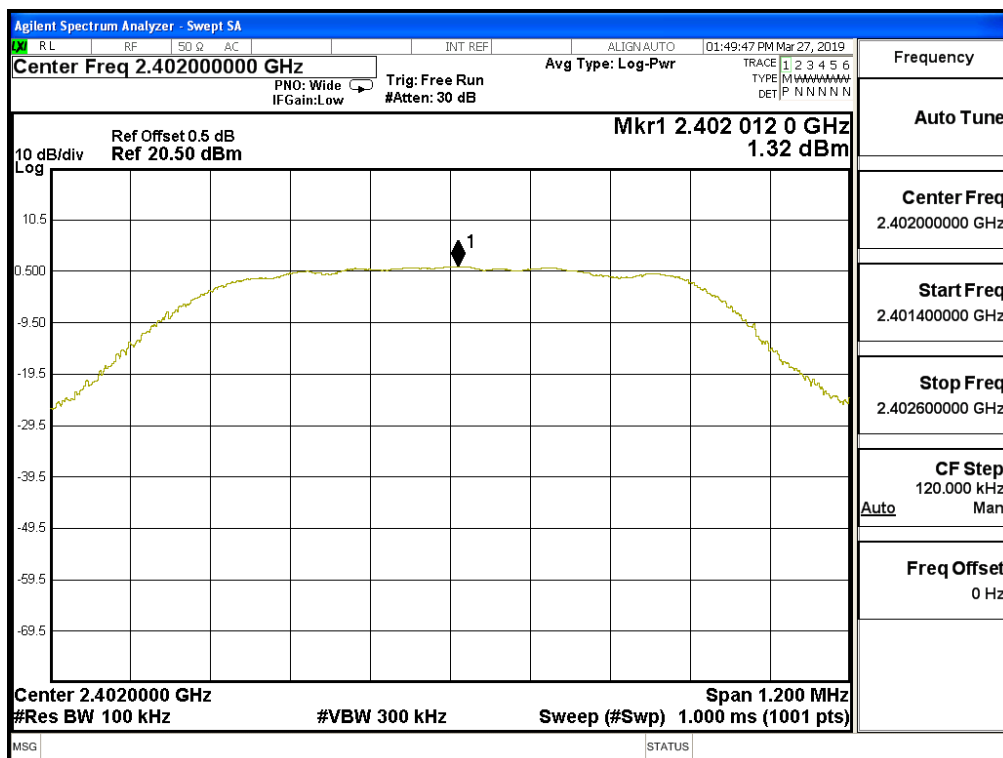
± 1.20 dB

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	1.32	≤ 8dBm	Pass

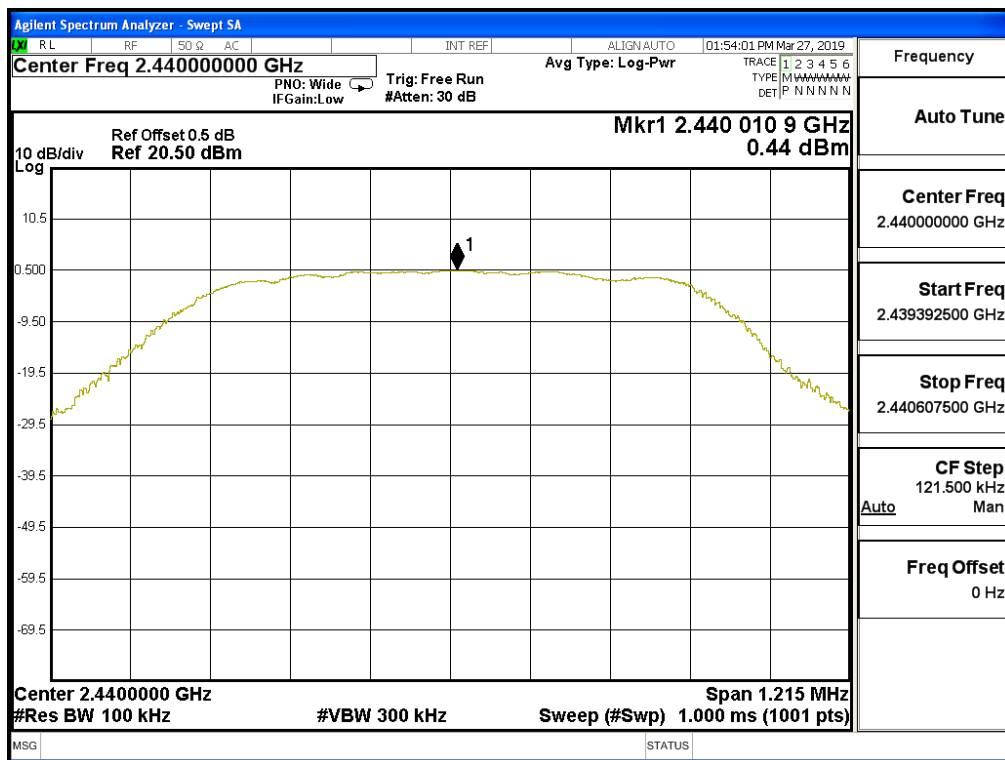
Figure Channel 00:



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	0.44	≤ 8dBm	Pass

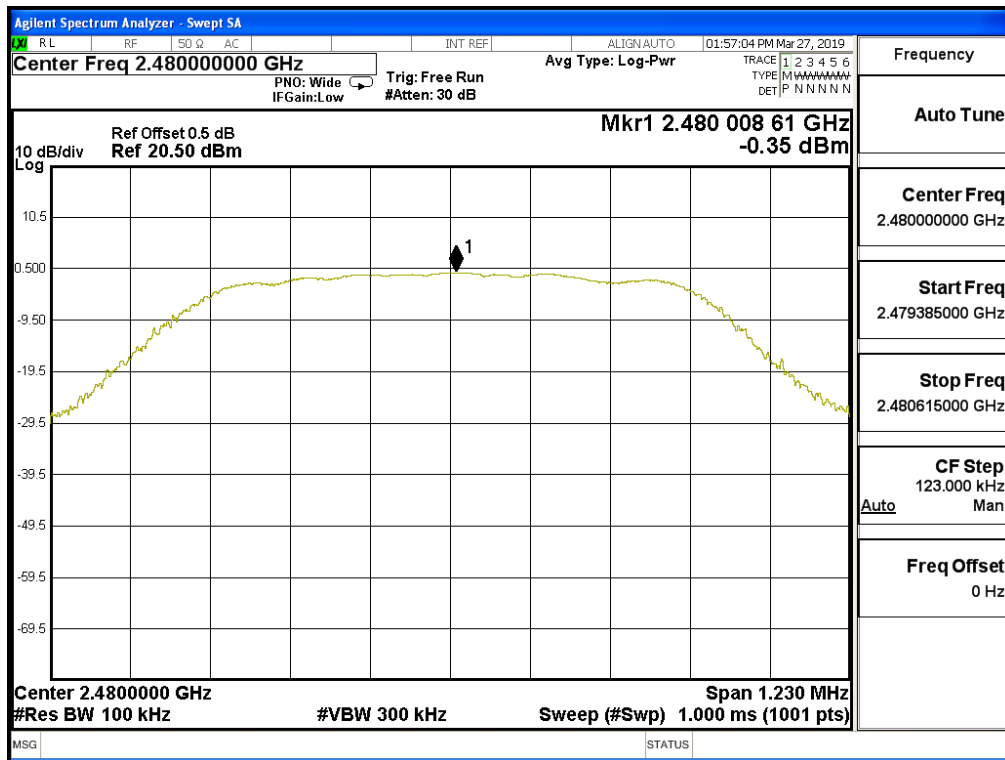
Figure Channel 19:



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)

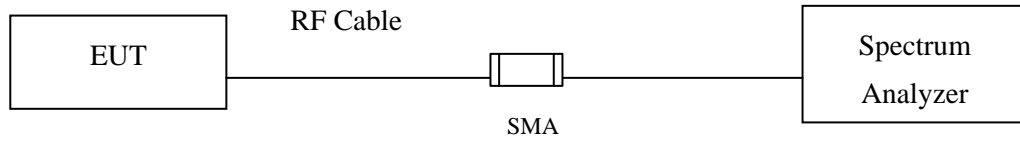
Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
39	2480	-0.35	≤ 8dBm	Pass

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

$\pm 2.31\text{msec}$

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)

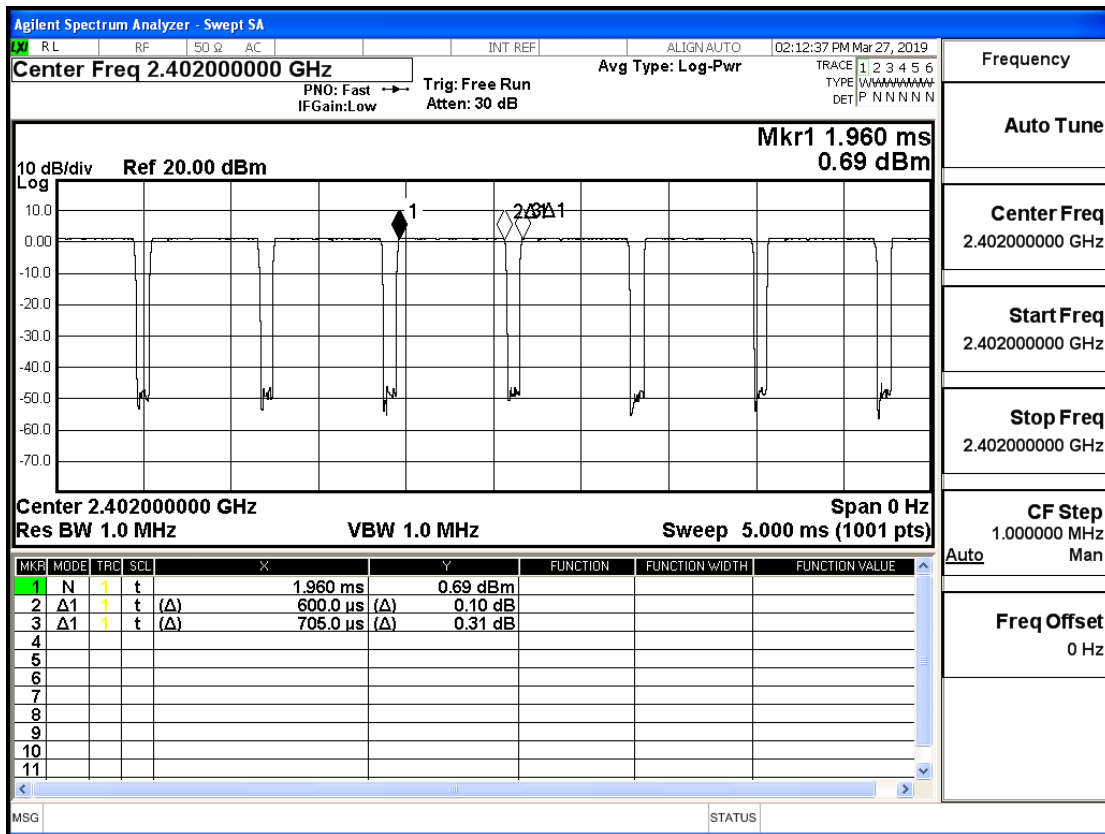
Duty Cycle Formula:

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

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

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
BLE	0.6000	0.7050	85.11	2.08



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.