



FCC&IC RADIO TEST REPORT

FCC ID: N7P-HRS01

IC ID: 10274A-HRS01

Product : BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded

Trade Name : Salutron,LifeFitness, Sportline,NB, PROFORM

Model Name : SALCS027

Serial Model : LFFCS030, ENBCS032, HGRCS029, PFBLT112

Report No. : NTEK- 2012DG0728073F

Prepared for

Salutron,Inc.

40979 Encyclopedia Circle, Fremont, California,United States

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : Salutron, Inc.

Address : 40979 Encyclopedia Circle, Fremont, California, United States

Manufacture's Name : Fairlegend Electronics, Ltd.

Address : Shang Cun, Yuan Shan Industrial Zone B, Gongming, Guangming New District, Shenzhen

Product description

Product name : BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded

Model and/or type reference : SALCS027

Serial Model : LFFCS030, ENBCS032, HGRCS029, PFBTL112

Standards : FCC Part15.247, RSS-210 Issue 8

Test procedure ANSI C63.4-2003, RSS-Gen Issue 3

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test :

Date (s) of performance of tests : 25 Jul. 2012 ~30 Jul. 2012

Date of Issue : 30 Jul. 2012

Test Result : **Pass**

Testing Engineer : Apple Huang
(Apple Huang)

Technical Manager : Tom Zhang
(Tom Zhang)

Authorized Signatory : Bovey Yang
(Bovey Yang)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C & RSS-210 Issue 8			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registration Number:238937; IC Registration Number:9270A-1

CNAS Registration Number:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded																
Trade Name	Salutron,LifeFitness, Sportline,NB, PROFORM																
Model Name	SALCS027																
Serial Model	LFFCS030, ENBCS032, HGRCS029, PFBLT112																
Model Difference	All model is same just OEM different.																
Product Description	The EUT is a BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded <table border="1"> <tr> <td>Operation Frequency:</td><td>2402~2480 MHz</td></tr> <tr> <td>Modulation Type:</td><td>FHSS</td></tr> <tr> <td>Bit Rate of Transmitter</td><td>GFSK</td></tr> <tr> <td>Number Of Channel</td><td>40 CH</td></tr> <tr> <td>Antenna Designation:</td><td>Please see Note 3.</td></tr> <tr> <td>Antenna Gain(Peak)</td><td>0dBi</td></tr> <tr> <td>Output Power(Conducted):</td><td>-0.014dBm (Max.)</td></tr> <tr> <td>EIRP:</td><td>-0.014dBm(Max.)</td></tr> </table> Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	Operation Frequency:	2402~2480 MHz	Modulation Type:	FHSS	Bit Rate of Transmitter	GFSK	Number Of Channel	40 CH	Antenna Designation:	Please see Note 3.	Antenna Gain(Peak)	0dBi	Output Power(Conducted):	-0.014dBm (Max.)	EIRP:	-0.014dBm(Max.)
Operation Frequency:	2402~2480 MHz																
Modulation Type:	FHSS																
Bit Rate of Transmitter	GFSK																
Number Of Channel	40 CH																
Antenna Designation:	Please see Note 3.																
Antenna Gain(Peak)	0dBi																
Output Power(Conducted):	-0.014dBm (Max.)																
EIRP:	-0.014dBm(Max.)																
Adapter	N/A																
Battery	Rated Voltage: 3V																
Connecting I/O Port(s)	Please refer to the User's Manual																

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Printed Antenna	NA	0	BT Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH20
Mode 3	CH40

For Conducted Emission	
Final Test Mode	Description
/	/

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH20
Mode 3	CH40

Note:

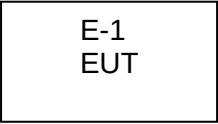
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT use new battery.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	SmartRF_Studio_7-1.8.0		
Frequency	2402 MHz	2442 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

A block diagram showing the configuration of the system tested. It consists of a single rectangular box containing the text "E-1" and "EUT" stacked vertically.

E-1
EUT

2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Salutron, LifeFitness, Sportline, NB, PROFORM	SALCS027	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	160400005	Jul. 06. 2013
2	Test Receiver	R&S	ESPI	101318	Jul. 06. 2013
3	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 06. 2013
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 06. 2013
6	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06. 2013
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 06. 2013
8	Amplifier	EM	EM-30180	060538	Jul. 06. 2013
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 06. 2013
10	Power Meter	R&S	NRVS	100696	Jul. 06. 2013

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 06. 2013
2	LISN	R&S	ENV216	101313	Jul. 06. 2013
3	LISN	EMCO	3816/2	00042990	Jul. 06. 2013
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 06. 2013
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 06. 2013
6	Absorbing clamp	R&S	MOS-21	100423	Jul. 06. 2013

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

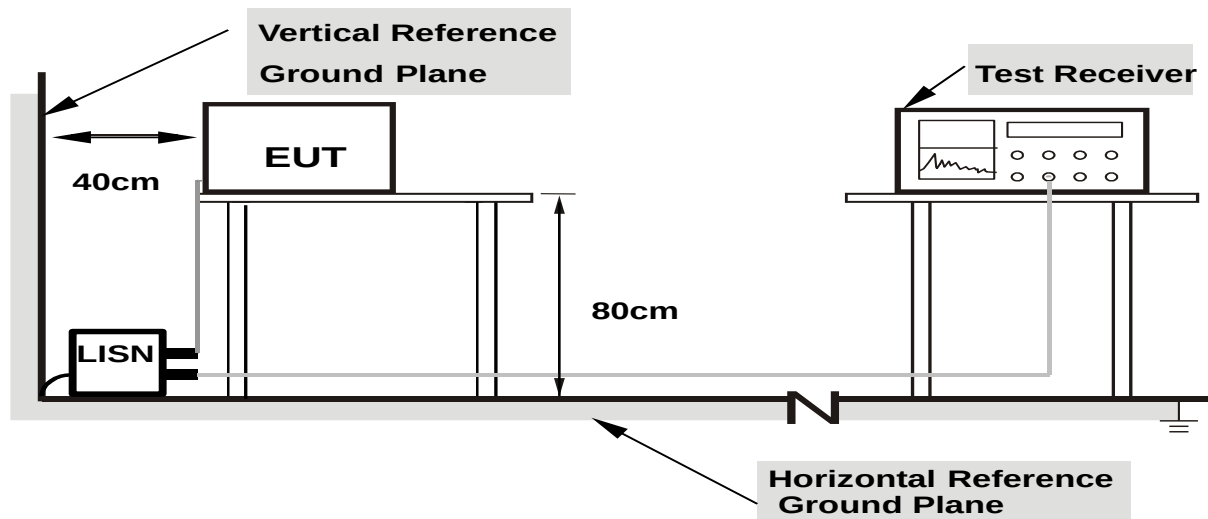
3.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N/A
Test Voltage :	N/A	Test Mode :	N/A

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

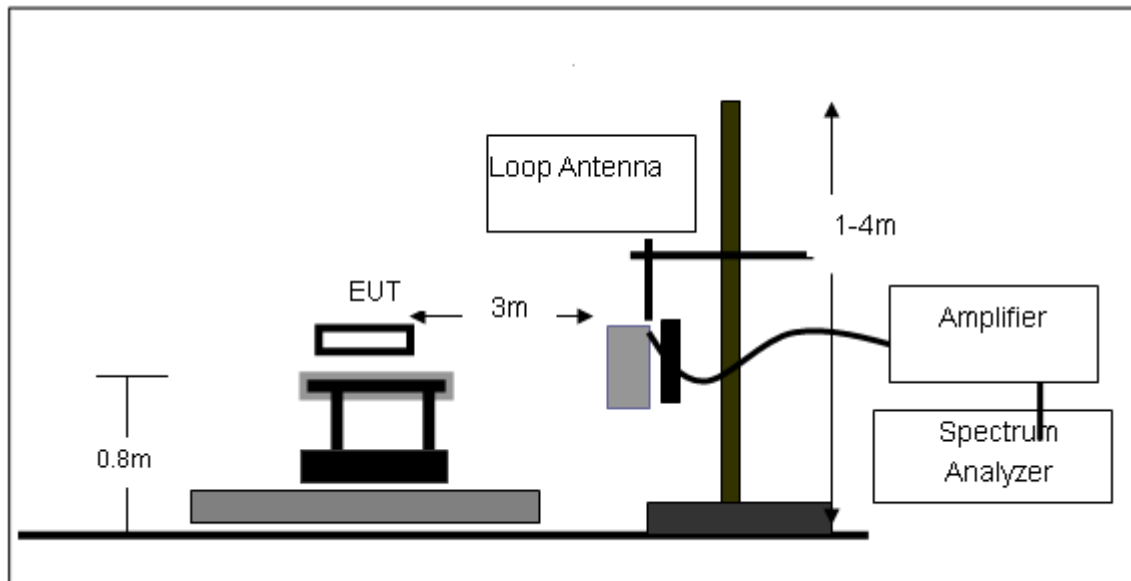
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

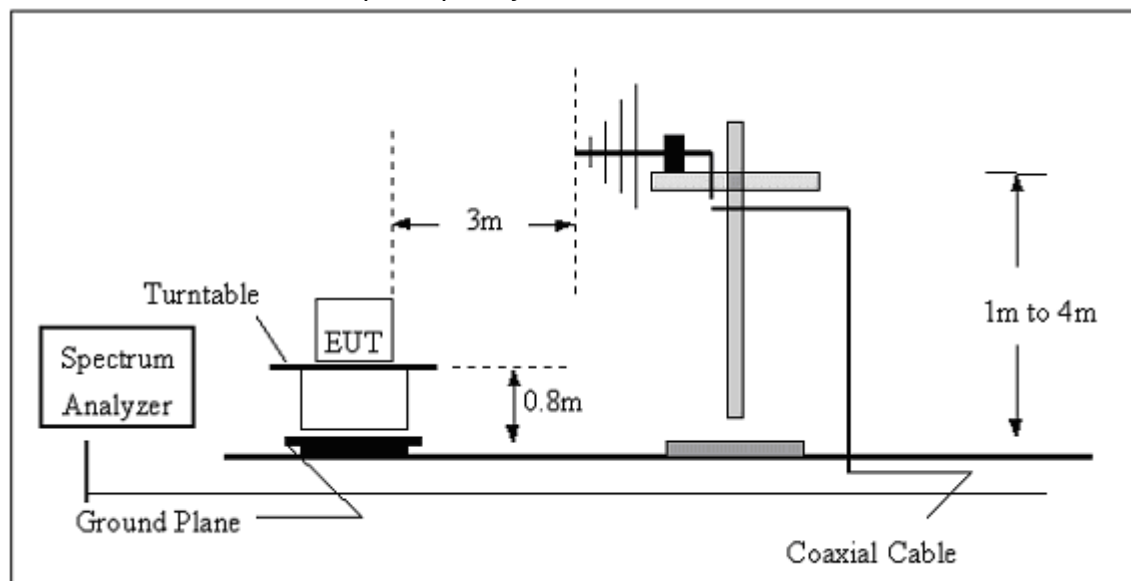
No deviation

3.2.4 TEST SETUP

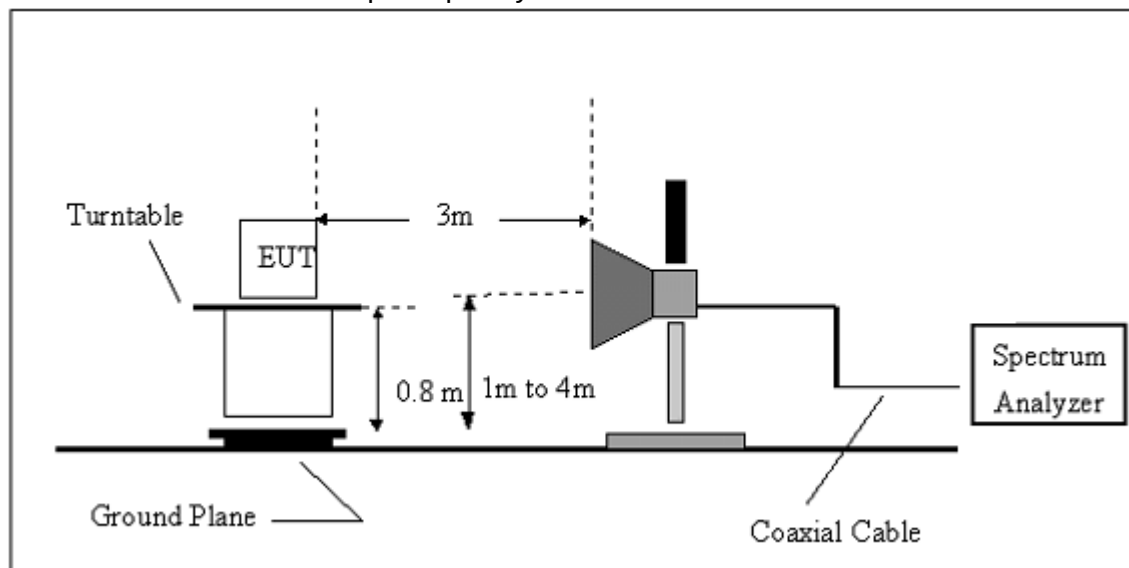
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz

**3.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	DC 3V by battery		
Test Mode :	TX		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $20 \log (\text{specific distance/test distance})(\text{dB})$;

Limit line = specific limits(dBuv) + distance extrapolation factor.

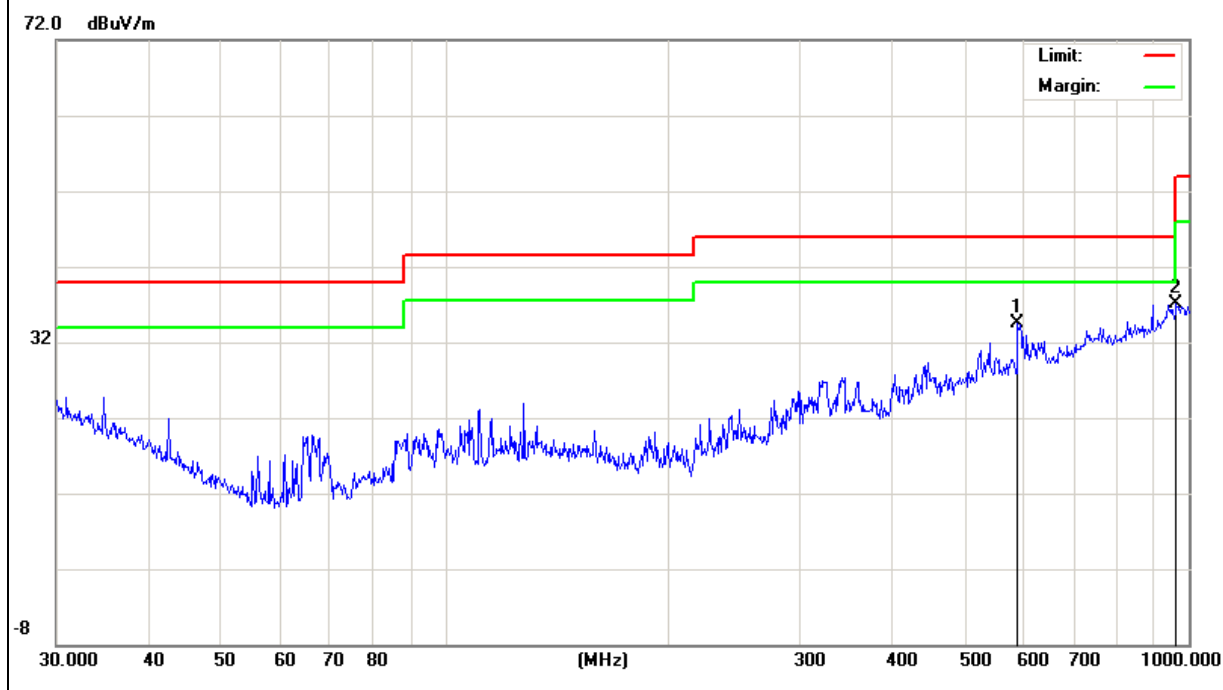
3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
588.9048	12.12	22.38	34.5	46	-11.5	peak
962.1621	7.22	29.87	37.09	54	-16.91	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

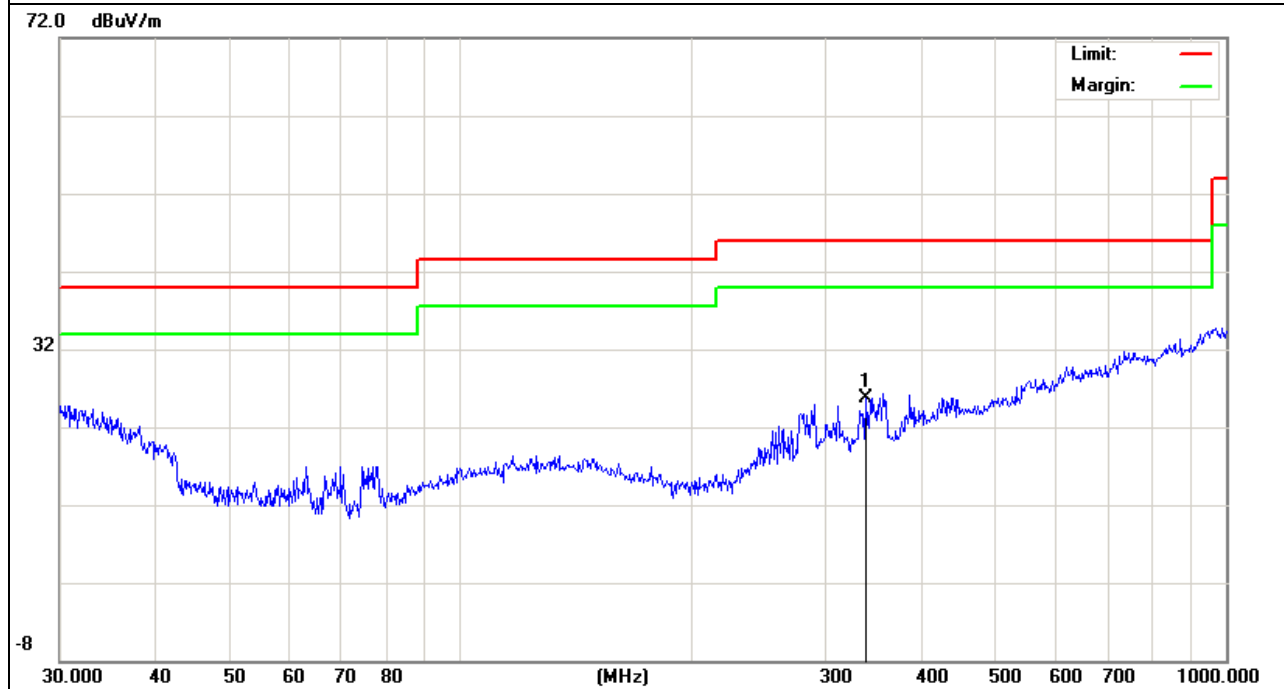


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2402MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
338.4001	10.63	15.07	25.7	46	-20.3	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



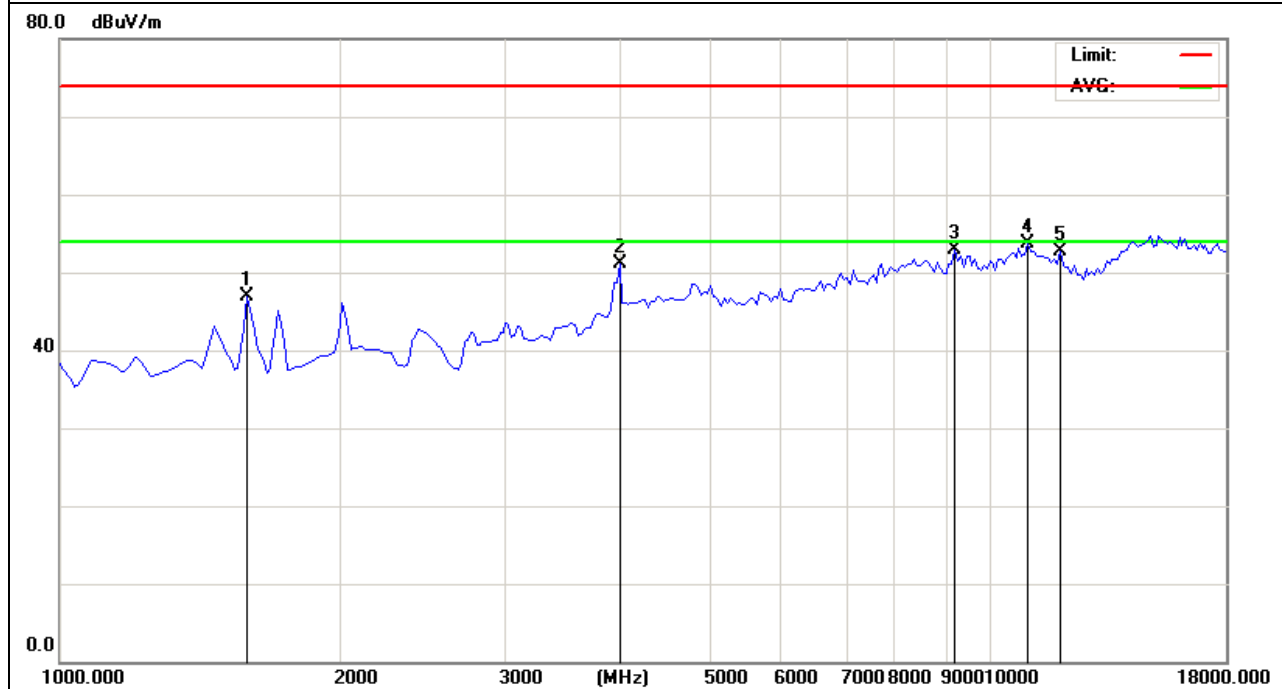
3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2402MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1595	63.36	-16.43	46.93	74	-27.07	peak
4017.5	57.51	-6.33	51.18	74	-22.82	peak
9245	50.58	2.29	52.87	74	-21.13	peak
11030.00 0	49.79	3.82	53.61	74	-20.39	peak
11965.00 0	46.33	6.32	52.65	74	-21.35	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

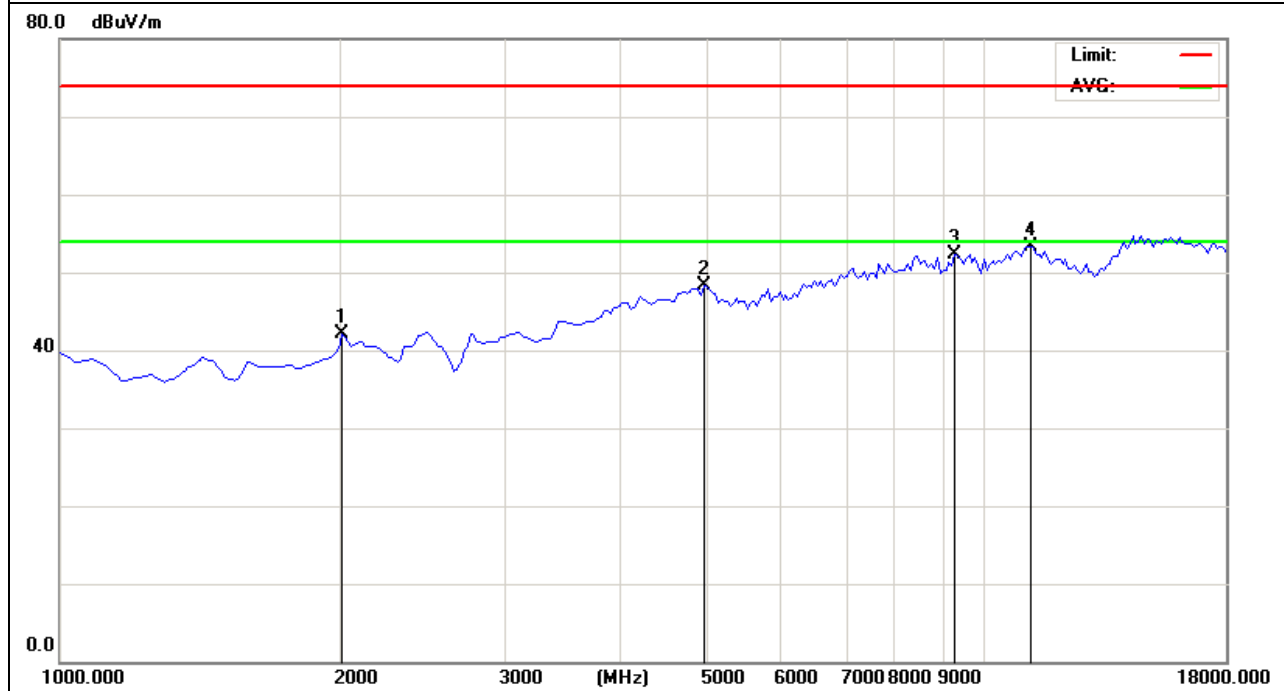


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2402MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2020	54.99	-12.92	42.07	74	-31.93	peak
4952.5	51.89	-3.55	48.34	74	-25.66	peak
9245	49.96	2.29	52.25	74	-21.75	peak
11157.50 0	50.25	3.13	53.38	74	-20.62	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

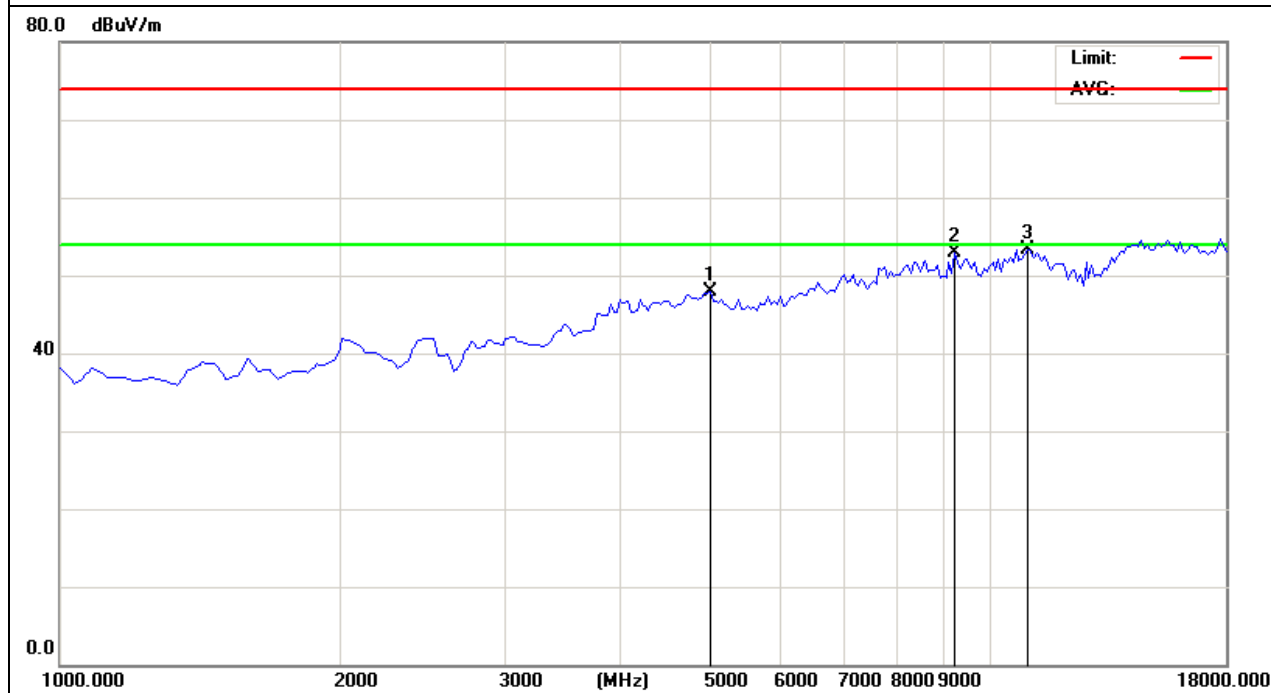


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2442MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5037.5	51.79	-3.83	47.96	74	-26.04	peak
9245	50.62	2.29	52.91	74	-21.09	peak
11030.00 0	49.56	3.82	53.38	74	-20.62	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

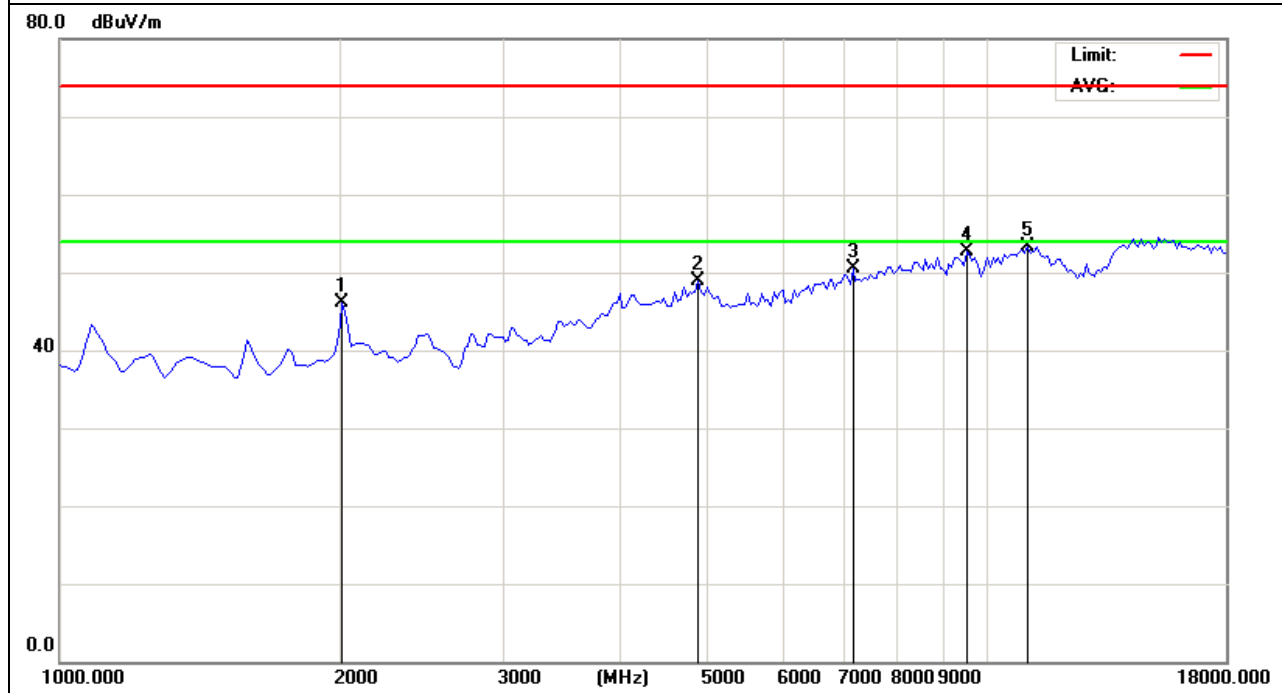


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2442MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2020	59.07	-12.92	46.15	74	-27.85	peak
4867.5	52.5	-3.61	48.89	74	-25.11	peak
7162.5	50.71	-0.17	50.54	74	-23.46	peak
9500	50.29	2.49	52.78	74	-21.22	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

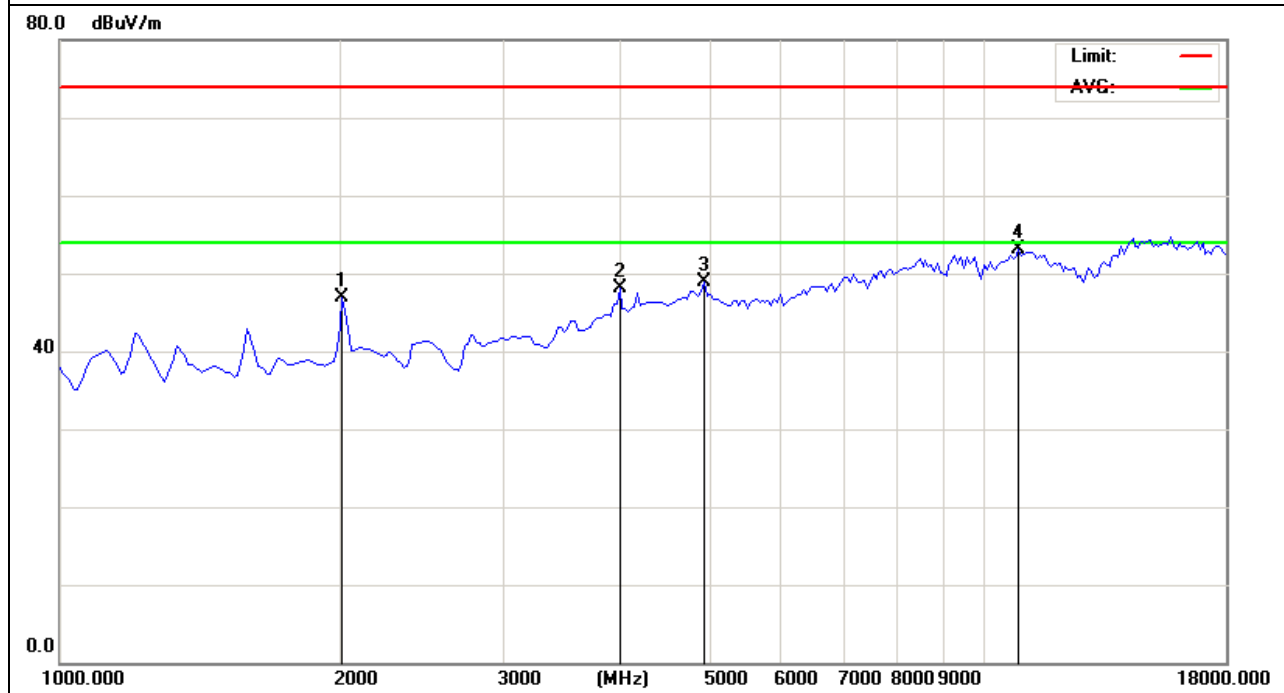


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2480MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2020	59.82	-12.92	46.9	74	-27.1	peak
4017.5	54.34	-6.33	48.01	74	-25.99	peak
4952.5	52.38	-3.55	48.83	74	-25.17	peak
10817.50 0	49.96	3.13	53.09	74	-20.91	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

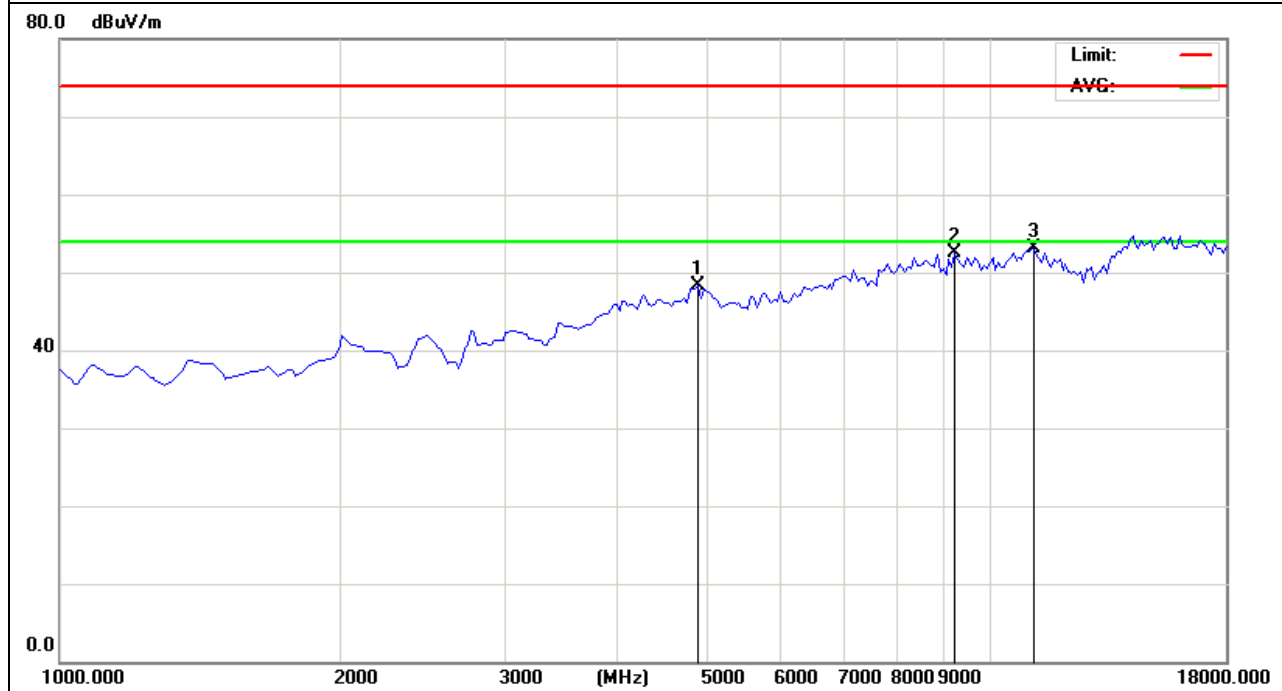


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX 2480MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4867.5	51.86	-3.61	48.25	74	-25.75	peak
9245	50.17	2.29	52.46	74	-21.54	peak
11200.00 0	50.02	3.04	53.06	74	-20.94	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



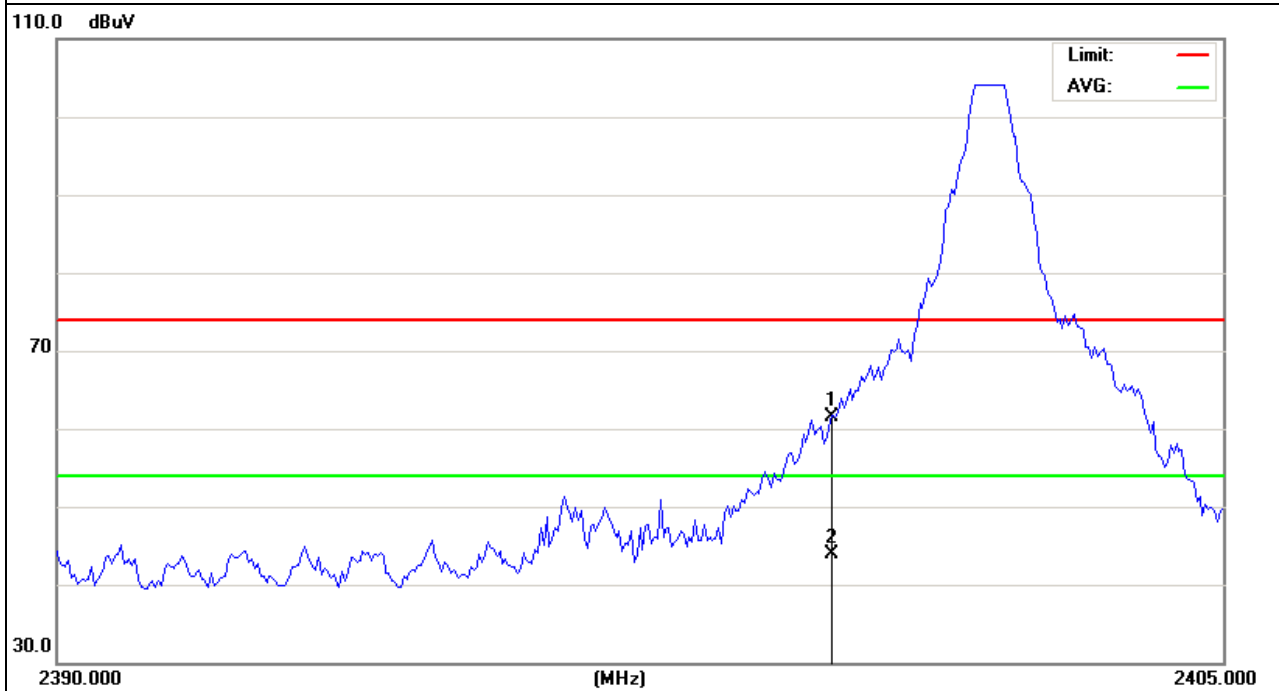
3.2.9 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX /2402MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2400	74.51	-12.99	61.52	74	-12.48	peak
2400	56.96	-12.99	43.97	54	-10.03	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

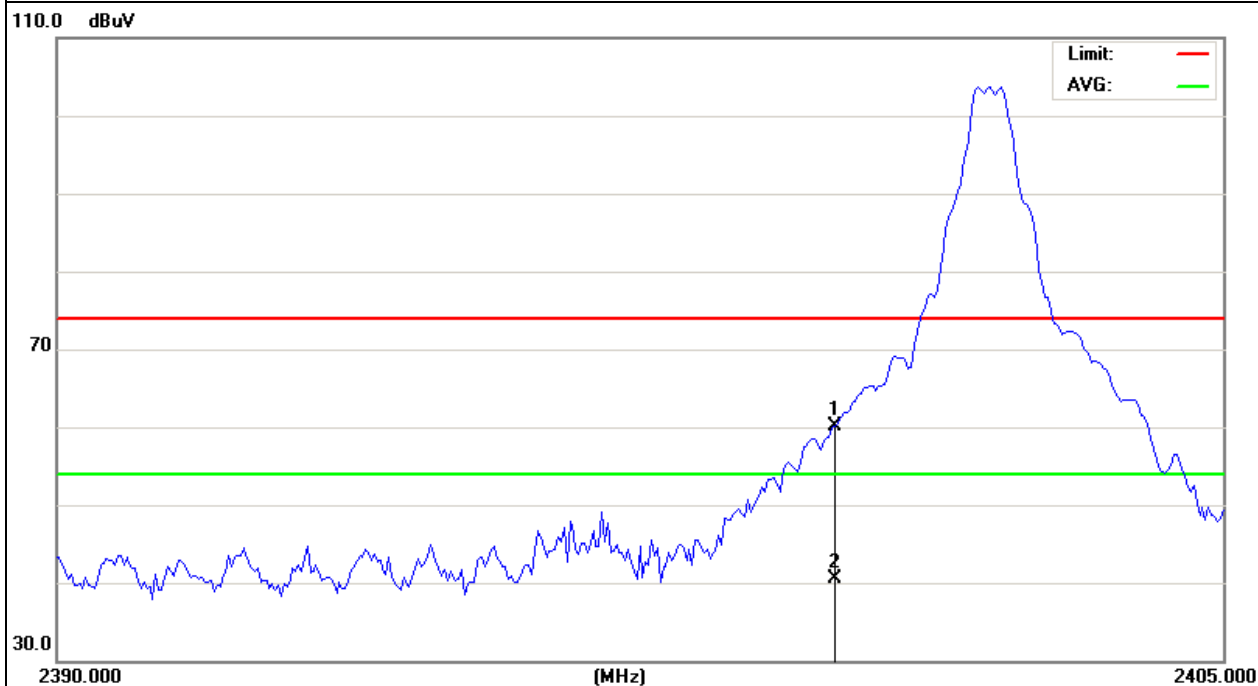


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX /2402MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400	73.14	-12.99	60.15	74	-13.85	peak
2400	53.44	-12.99	40.45	54	-13.55	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

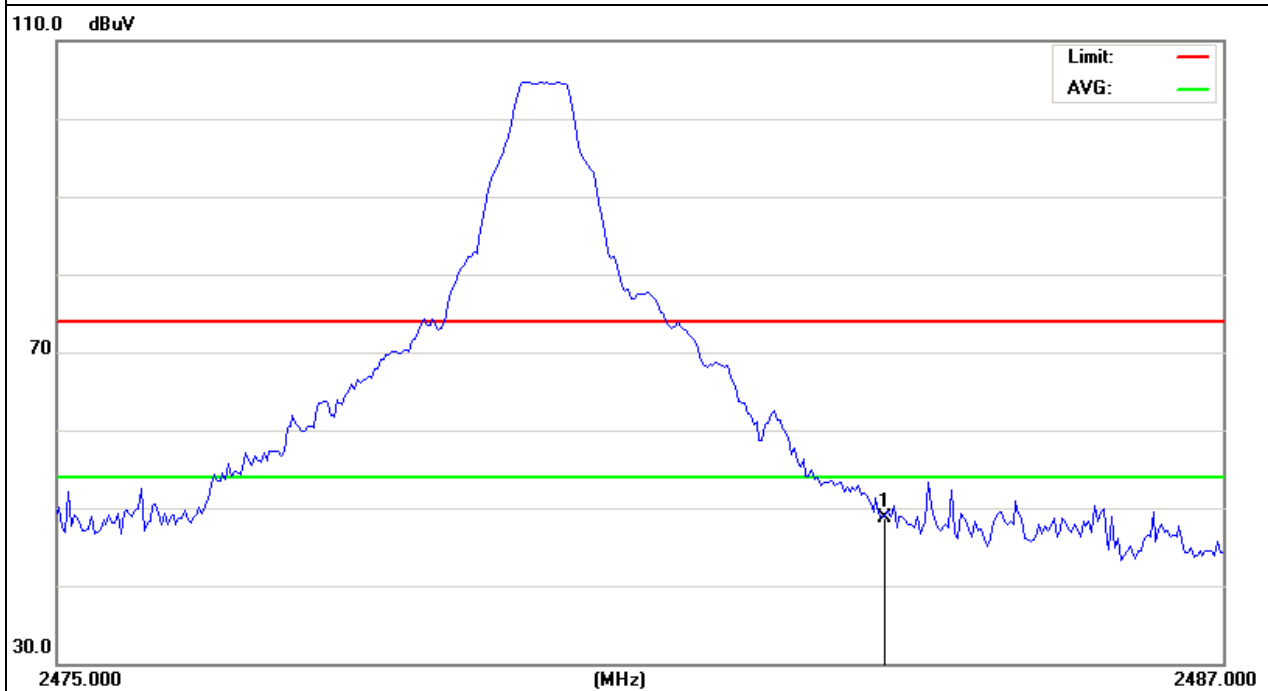


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX /2480MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	61.57	-12.78	48.79	74	-25.21	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

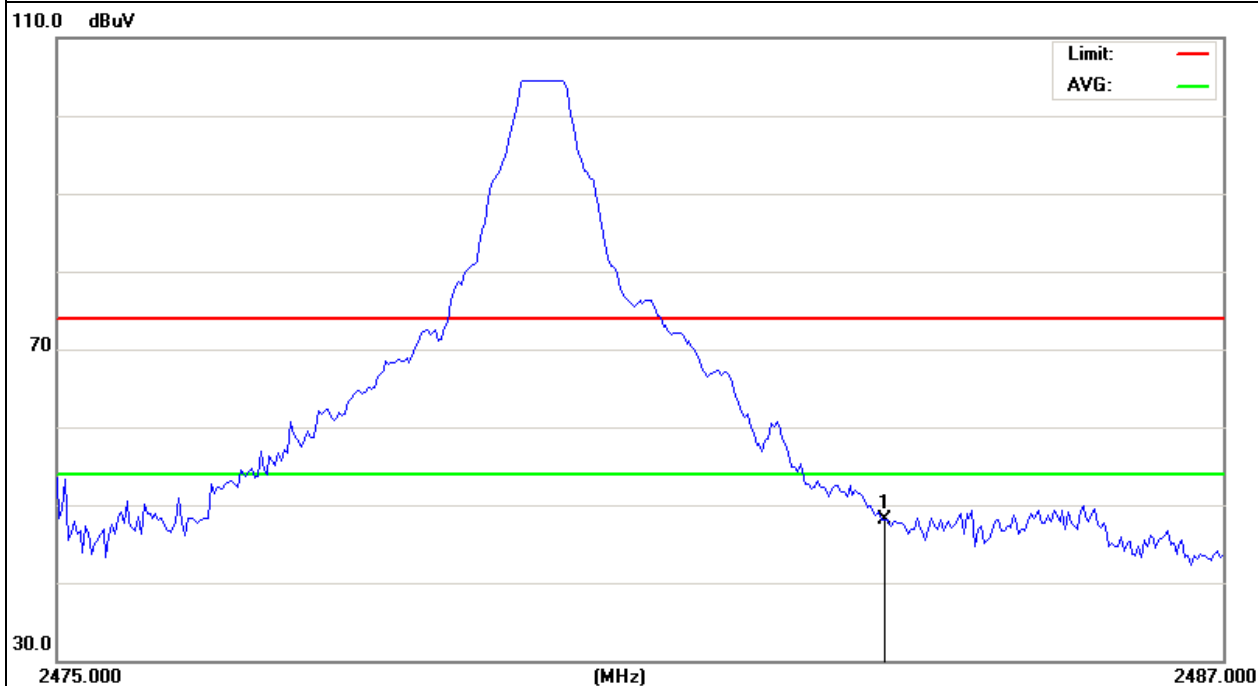


EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3V by battery
Test Mode :	TX /2480MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.5	60.83	-12.78	48.05	74	-25.95	peak

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



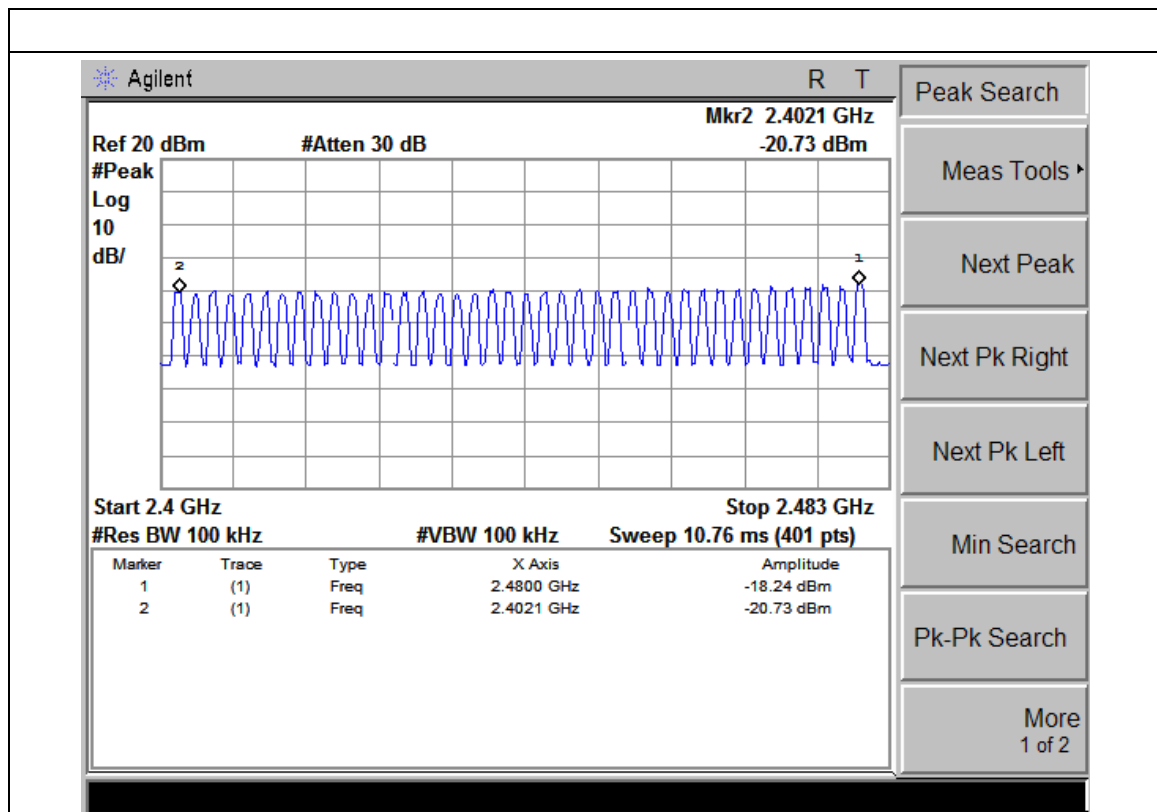
4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 3V by battery
Test Mode :	Hopping Mode		

Number of Hopping Channel	40
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5. AVERAGE TIME OF OCCUPANCY

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

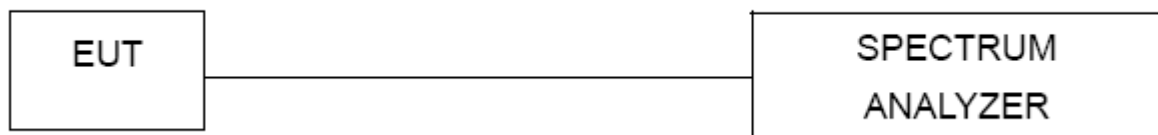
5.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure system hopping hops in any 5s..
- Measure the maximum time duration of one single pulse.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

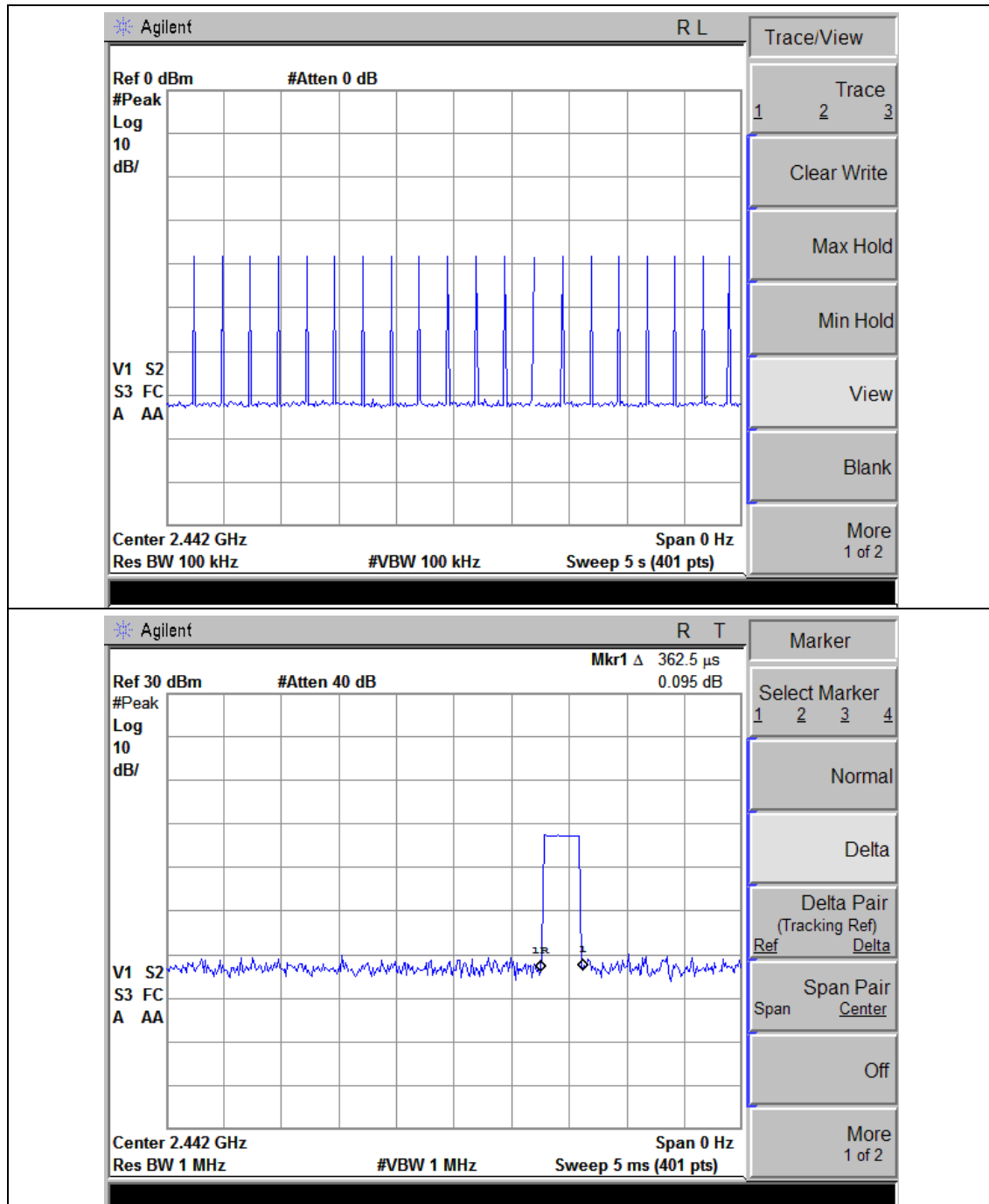


5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3V by battery



NOTE: This system hopping 20 hops in any 5s, and for each hop it transmit 1 pulses, the pulse dwell are 0.362ms, so the dwell times are:

$$20/5 \times 40 \times 0.4 \times 0.362 = 23.17 \text{ms}$$

6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

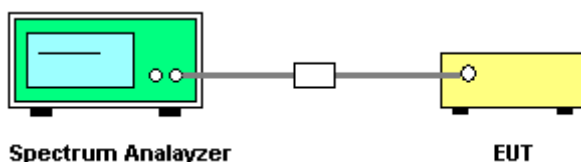
6.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

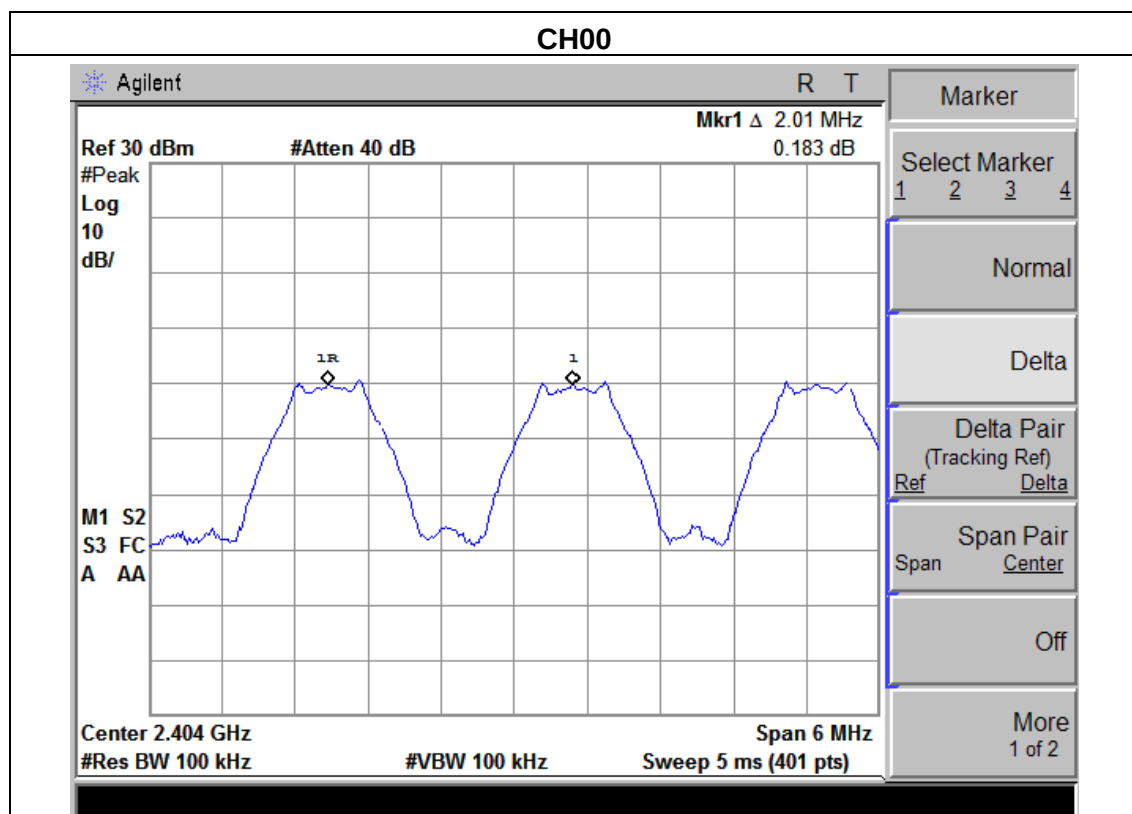
The EUT was programmed to be in continuously transmitting mode.

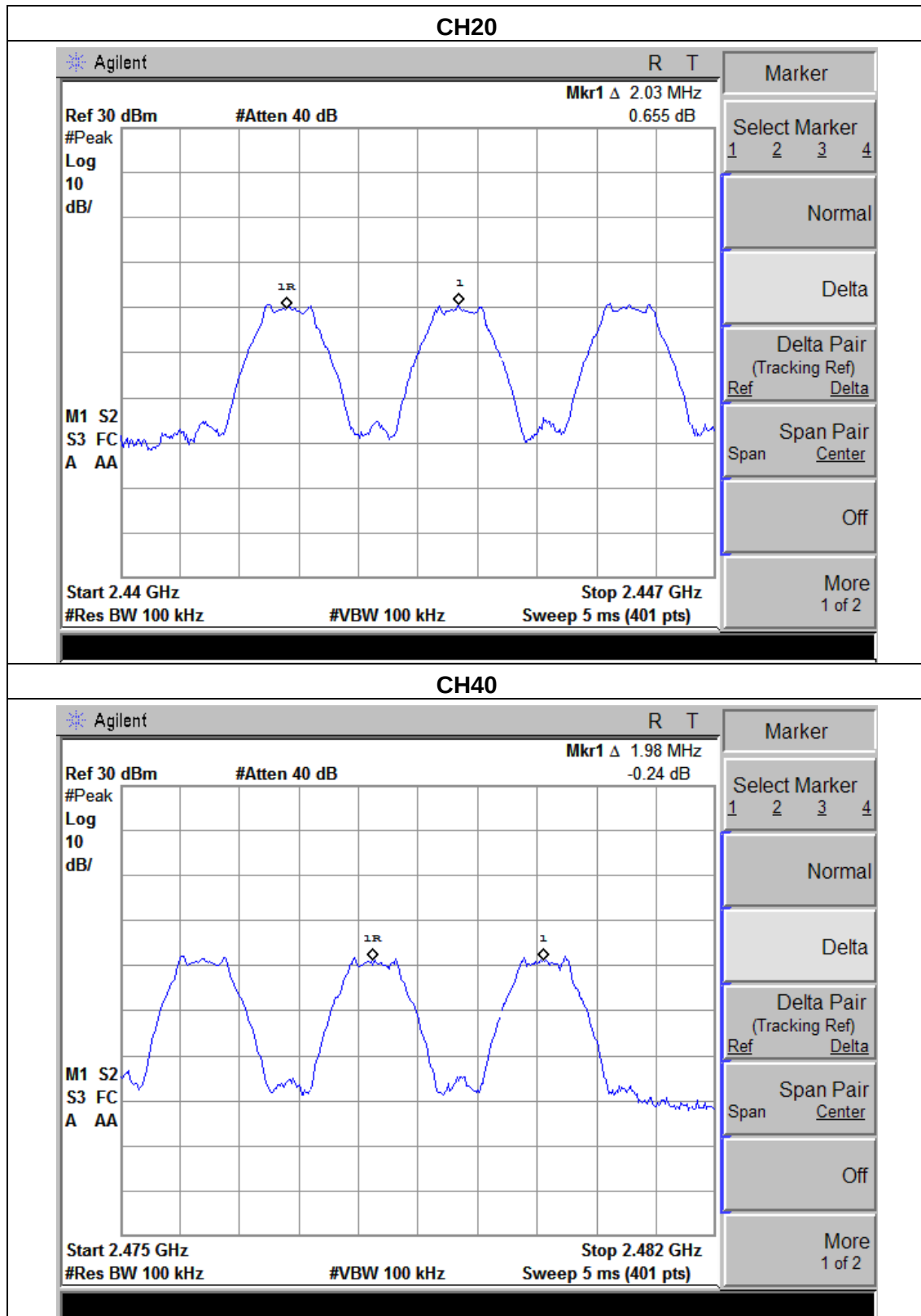
6.1.5 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3V by battery
Test Mode :	CH00 / CH20 /CH40		

Frequency	Channel Separation (MHz)	Result
2402 MHz	2.01	Complies
2442 MHz	2.01	Complies
2480 MHz	1.98	Complies

Ch. Separation Limits: >20dB bandwidth or >2/3 of 20dB bandwidth




CH40

R T

Ref 30 dBm
#Peak
Log
10
dB/

#Atten 40 dB

Mkr1 Δ 1.98 MHz
-0.24 dB

M1 S2
S3 FC
A AA

Start 2.475 GHz
#Res BW 100 kHz

#VBW 100 kHz

Stop 2.482 GHz
Sweep 5 ms (401 pts)

Marker

Select Marker

1 2 3 4

Normal

Delta

Delta Pair
(Tracking Ref)

Ref Delta

Span Pair

Span Center

Off

More
1 of 2

7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

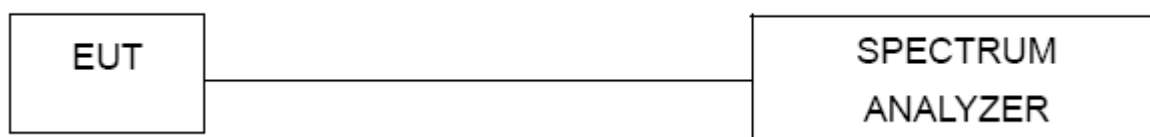
7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



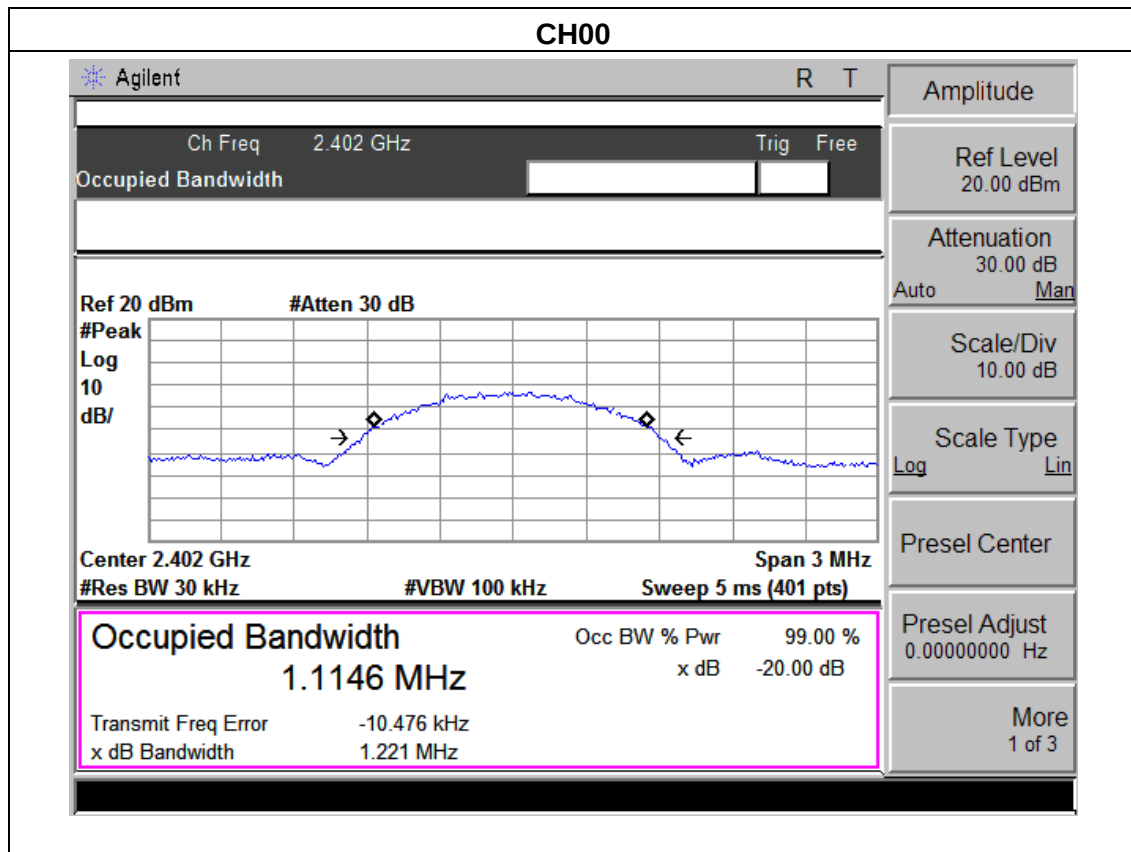
7.1.4 EUT OPERATION CONDITIONS

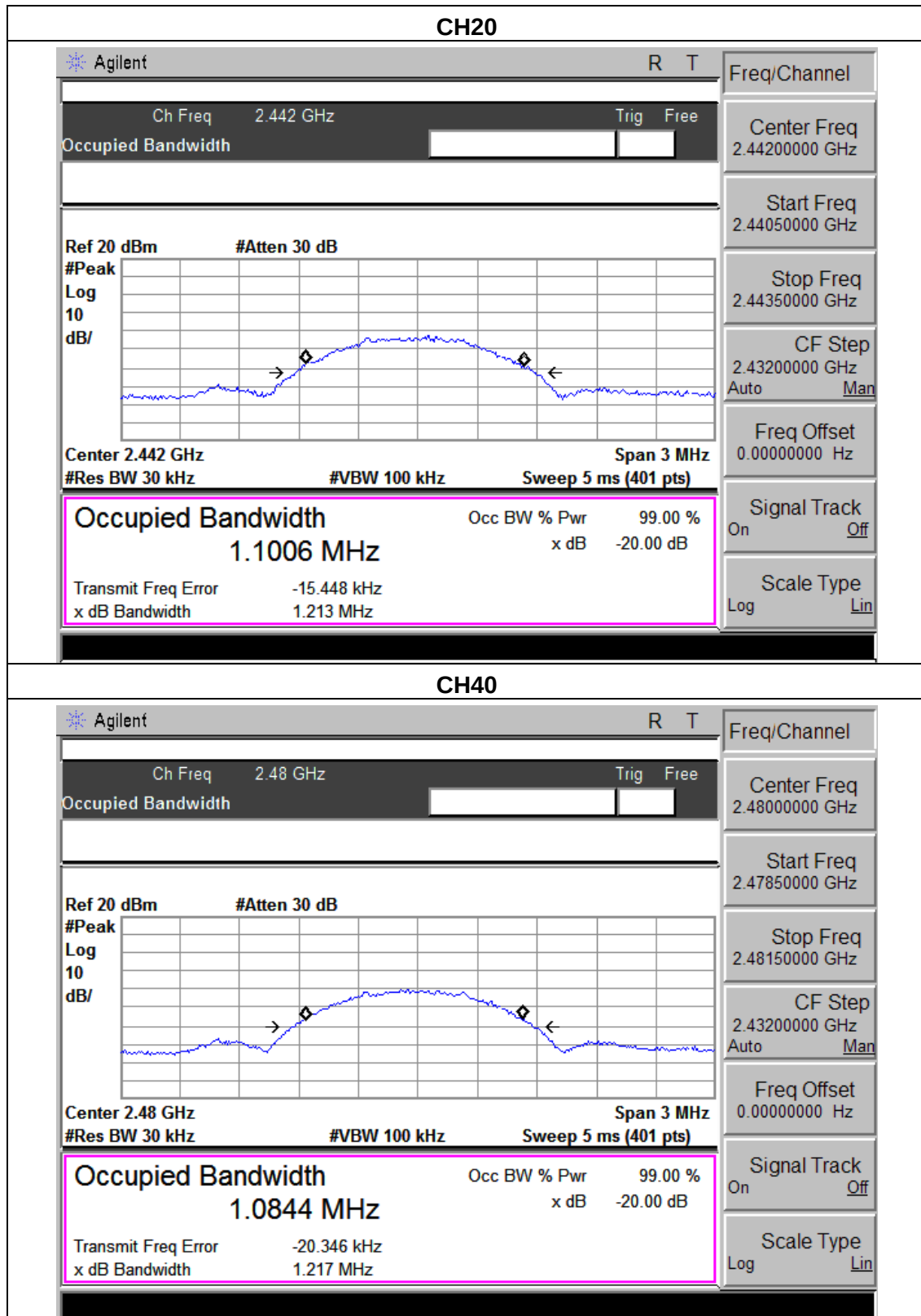
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3V by battery
Test Mode :	CH00 / CH20 /CH40		

Frequency	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
2402 MHz	1.221	1.1146	PASS
2442 MHz	1.212	1.1006	PASS
2480 MHz	1.217	1.0844	PASS





8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 20.96dBm	2400-2483.5	PASS

8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 1MHz, VBW= 1MHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



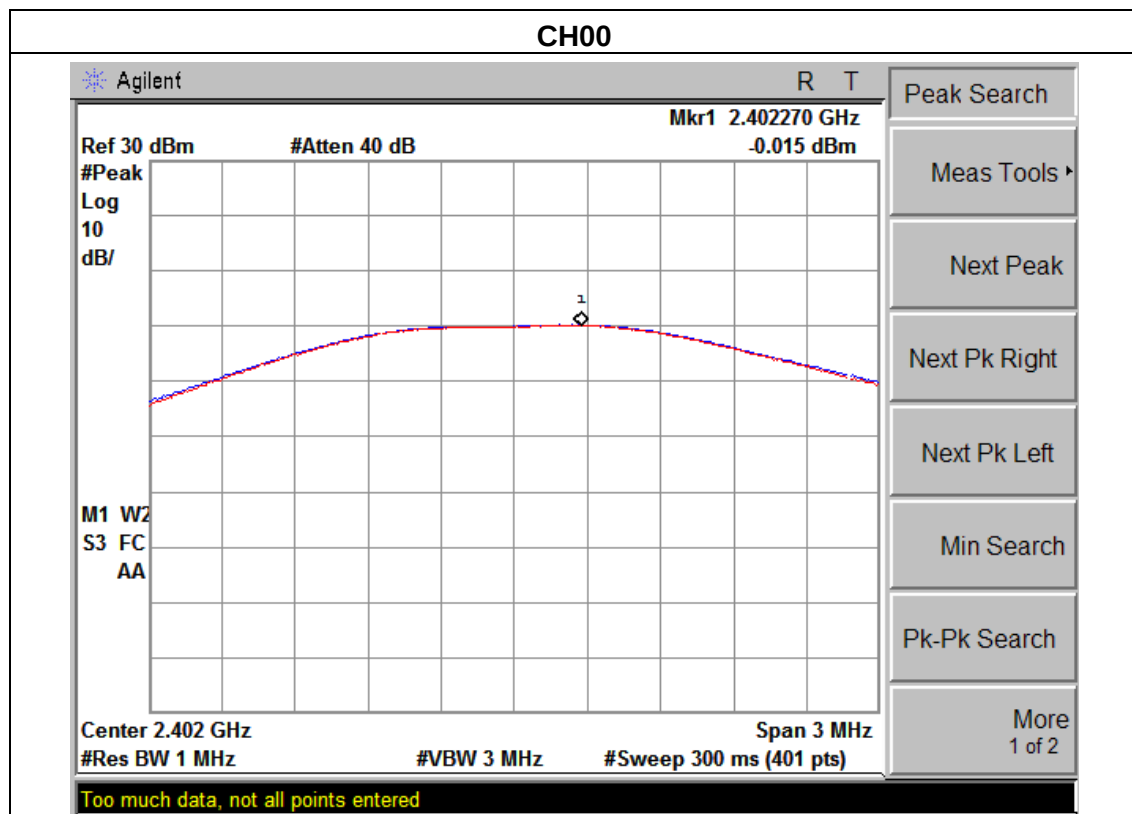
8.1.4 EUT OPERATION CONDITIONS

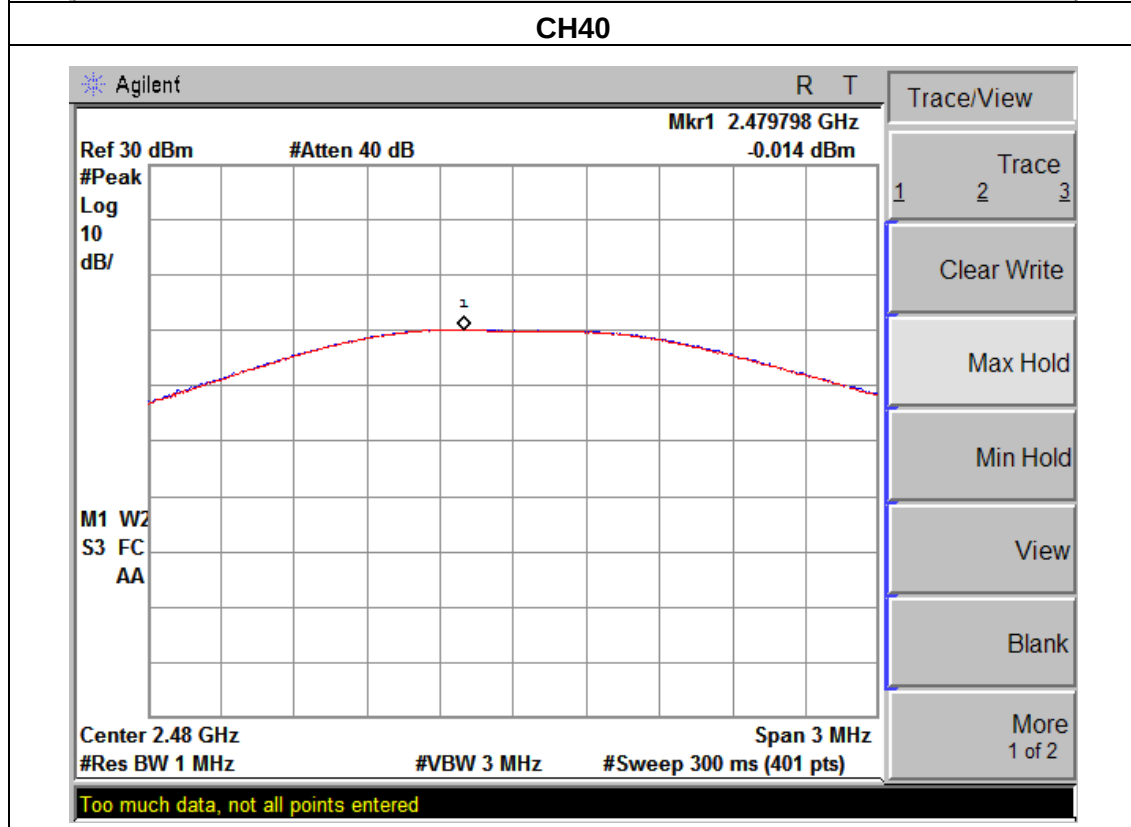
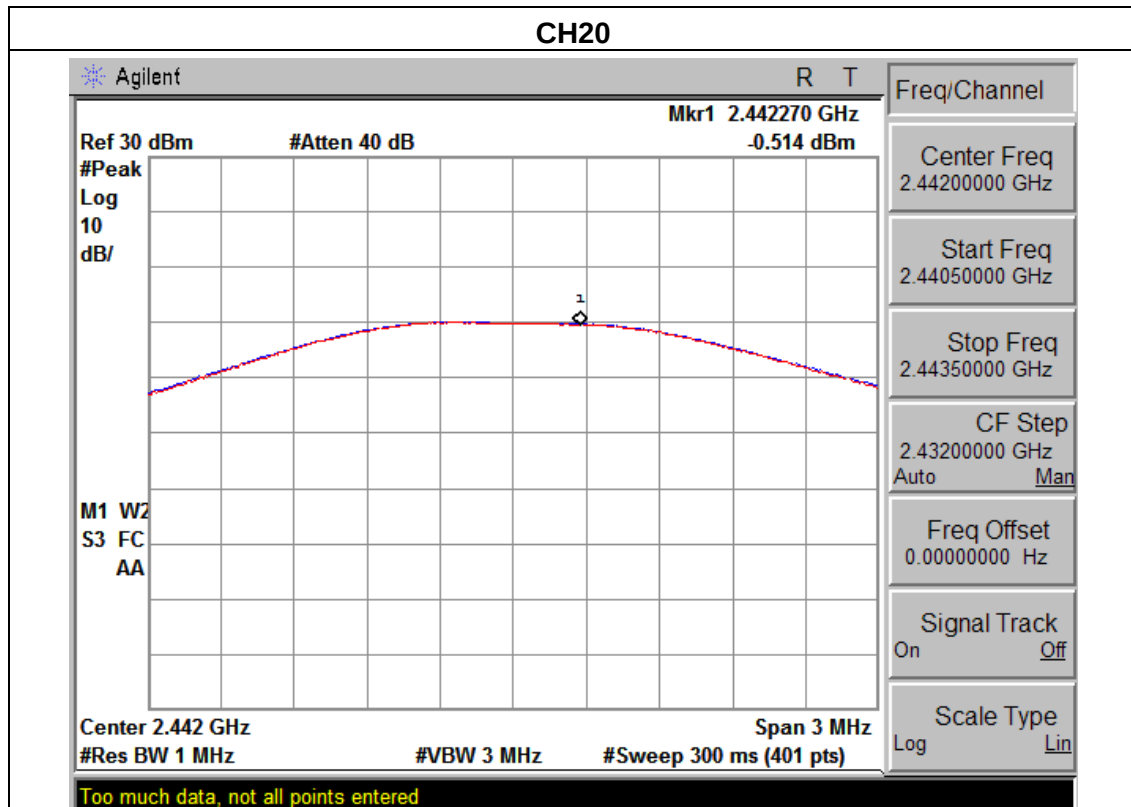
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

EUT :	BLE/5kHz Heart Rate Monitor, Molded Chest Strap (Hard), Uncoded	Model Name :	SALCS027
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3V by battery
Test Mode :	CH00/ CH20 /CH40		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH00	2402	-0.015	30	1
CH20	2442	-0.514	30	1
CH40	2480	-0.014	30	1





9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is integral Antenna. It comply with the standard requirement.

10. EUT TEST PHOTO**Radiated Measurement Photos**