



RF TEST REPORT

Report No.: SET2015-18520

Product Name: Telemetry transmitter

FCC ID: ZLZTD60858

Model No. : TD60

Applicant: Shenzhen Mindray Bio-Medical Electronics Co.,Ltd.

Applicant Address: Mindray Buiding,Keji 12th Road South,High-tech Industrial
Park,Nanshan,Shenzhen,P.R.China

Dates of Testing: 12/01/2015 — 12/14/2015

Issued by: CCIC-SET

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District,
Shenzhen, 518055, P. R. China

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Test Report

Product Name : Telemetry transmitter

Brand Name : Mindray

Trade Name : **mindray**迈瑞

Applicant : Shenzhen Mindray Bio-Medical Electronics Co.,Ltd.

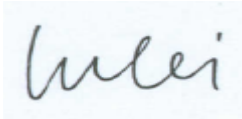
Applicant Address : Mindray Buiding,Keji 12th Road South,High-tech Industrial Park,Nanshan,Shenzhen,P.R.China


Manufacturer : Shenzhen Mindray Bio-Medical Electronics Co.,Ltd.

Manufacturer Address : Mindray Buiding,Keji 12th Road South,High-tech Industrial Park,Nanshan,Shenzhen,P.R.China

Test Standards : 47 CFR Part 95H: Wireless Medical Telemetry Service (WMTS)
ANSI C63.4:2009: American National Standard for Testing Unlicensed Wireless Devices
ANSI / TIA-603-C 2004: Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.

Test Result : PASS

Tested by : 
2015.12.15
Lu Lei, Test Engineer

Reviewed by : 
2015.12.15
Zhu Qi, Senior Engineer


Approved by : 
2015.12.15
Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	2015.12.15	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	Telemetry transmitter
Hardware Version	03-03-/
Software Version	01.02.00
Frequency Range	608~614MHz
Carrier Frequencies	608.3~613.7MHz (at interval of 25kHz)
Type of Equipment	Medical telemetry
Antenna Type	Antenna 1: LEAD antenna(Short cable of 3 and 5 core) Antenna 2: LEAD antenna(Long cable of 3 and 5 core)
Antenna Gain	Antenna 1: 0dBi Antenna 2: 0dBi

Note 1: The EUT is Telemetry transmitter, it operating at 608.3MHz~613.7MHz.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 3: The DUT was set in continuous transmit mode of operation.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 95 Subpart H for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 95H	Wireless Medical Telemetry Service(WMTS)
2	ANSI C63.4 2009	American National Standard for Testing Unlicensed Wireless Devices
3	ANSI / TIA-603-C:2004	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.

Test detailed items/section required by FCC rules and results are as below:

FCC Rules	Description of Test	Result
§95.1109	Labeling	Compliant ⁽¹⁾
§95.1115(a)	Field strength	Compliant
§95.1115(b)	Undesired Emissions	Compliant
§95.1115(c)	Emission types	Compliant
§ 2.1049 (1)	Occupied Bandwidth	Compliant
§95.1115(e)	Frequency Stability	Compliant ⁽¹⁾
§95.1125	RF safety	Compliant

(1) Provided by manufacturer



1.3 Facilities and Accreditations

1.3.1 Facilities

CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

1.3.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa



2. 47 CFR PART 95H REQUIREMENTS

2.1 Labeling

2.1.1 Requirement

As per FCC Part 95.1109 Equipment authorization requirement

- (a) Wireless medical telemetry devices operating under this part must be authorized under the certification procedure prior to marketing or use in accordance with the provisions of part 2, subpart J of this chapter.
- (b) Each device shall be labeled with the following statement: Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

2.1.2 Result: comply

The EUT has a label which complies with the Part 95.1109. Refer to FCC Label Sample and Label Location

2.2 Field Strength of Radiated Emissions

2.2.1 Requirement

As per FCC Part 95.1115(a)

In the 608-614 MHz band, the maximum allowable field strength is 200 mV/m, as measured at a distance of 3 meters , using measuring instrumentation with a CISPR quasi-peak detector.

2.2.2 Test Description

The measured Field Strength of Radiated Emissions was calculated by the reading of the spectrum analyzer and calibration.

A. Test Setup:

The radiated emission tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI C63.4:2009. The specification used was the FCC Part 95.1115(a) limits.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2015.06.03	2016.06.02
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2015.06.03	2016.06.02
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2015.06.03	2016.06.02
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.03	2016.06.02

2.2.3 Test Result

Antenna1

Indicated			Detector PK/QP/AV	FCC Part 95.1115(a)	
Frequency (MHz)	Antenna Polarity	Maximum Reading (dB μ V/m) @3m		Limit (dB μ V/m) @3m	Result
608.3	Horizontal	90.46	QP	106	Pass
608.3	Vertical	85.67	QP	106	Pass
611.0	Horizontal	90.71	QP	106	Pass
611.0	Vertical	85.84	QP	106	Pass
613.7	Horizontal	90.31	QP	106	Pass
613.7	Vertical	85.67	QP	106	Pass

Antenna2

Indicated			Detector PK/QP/AV	FCC Part 95.1115(a)	
Frequency (MHz)	Antenna Polarity	Maximum Reading (dB μ V/m) @3m		Limit (dB μ V/m) @3m	Result
608.3	Horizontal	90.34	QP	106	Pass
608.3	Vertical	85.54	QP	106	Pass
611.0	Horizontal	90.65	QP	106	Pass
611.0	Vertical	85.84	QP	106	Pass
613.7	Horizontal	90.24	QP	106	Pass
613.7	Vertical	86.49	QP	106	Pass



2.3 Occupied Bandwidth

2.3.1 Requirement

As per FCC Part 2.1049 (1)

In the 608-614 MHz band, wireless medical telemetry devices utilizing broadband technologies such as spread spectrum shall be capable of operating within one or more of the following channels of 1.5 MHz each, up to a maximum of 6 MHz, and shall operate on the minimum number of channels necessary to avoid harmful interference to any other wireless medical telemetry devices.

2.3.2 Test Description

The Occupied Bandwidth tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4:2009.

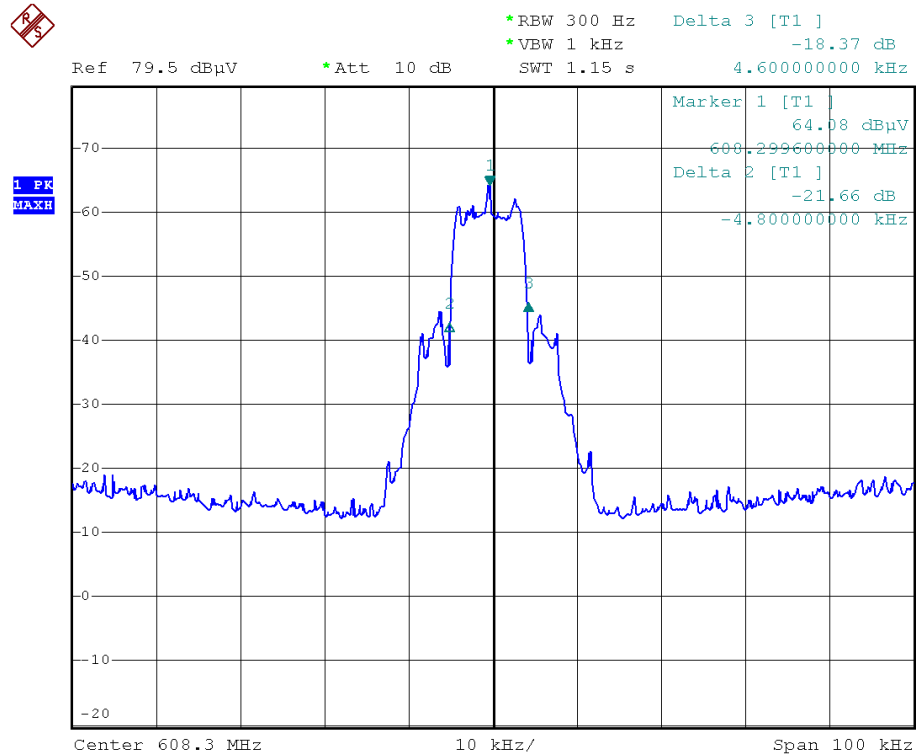
A. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2015.06.03	2016.06.02
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2015.06.03	2016.06.02
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2015.06.03	2016.06.02
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.03	2016.06.02

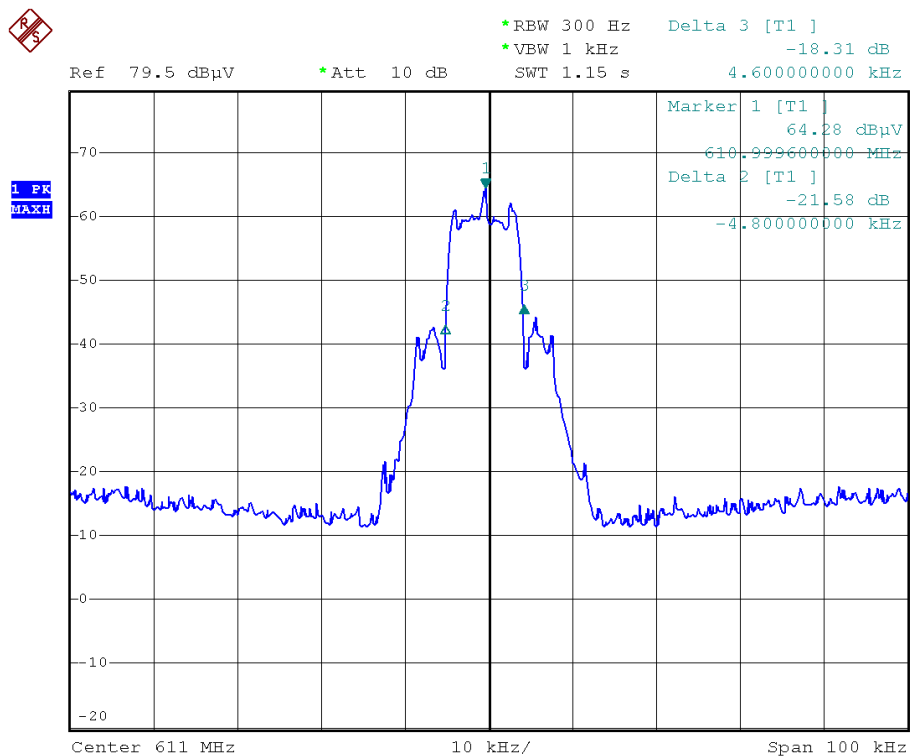
2.3.3 Test Result

The OBW is the same for all bands and frequencies.

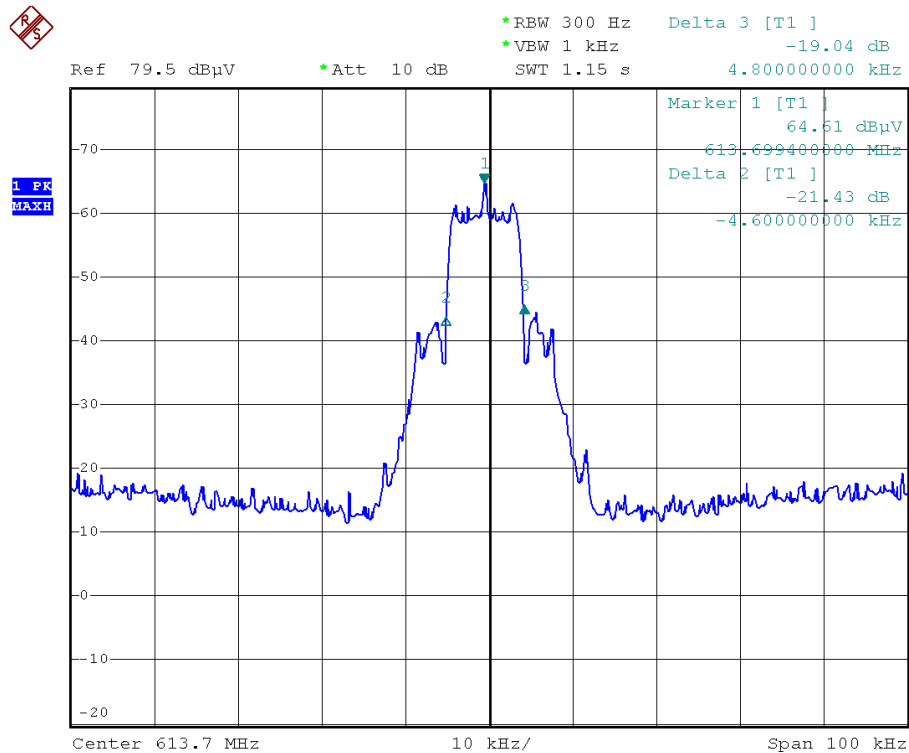
Occupied Bandwidth (Antenna 1)



Low Frequency =608.3MHz

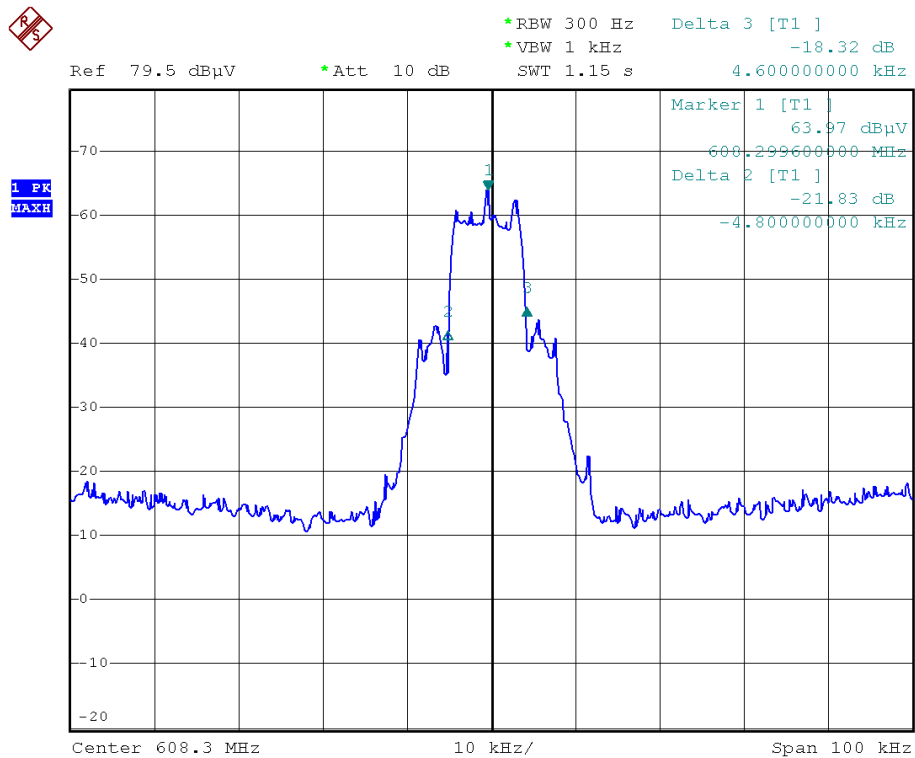


Middle Frequency =611MHz

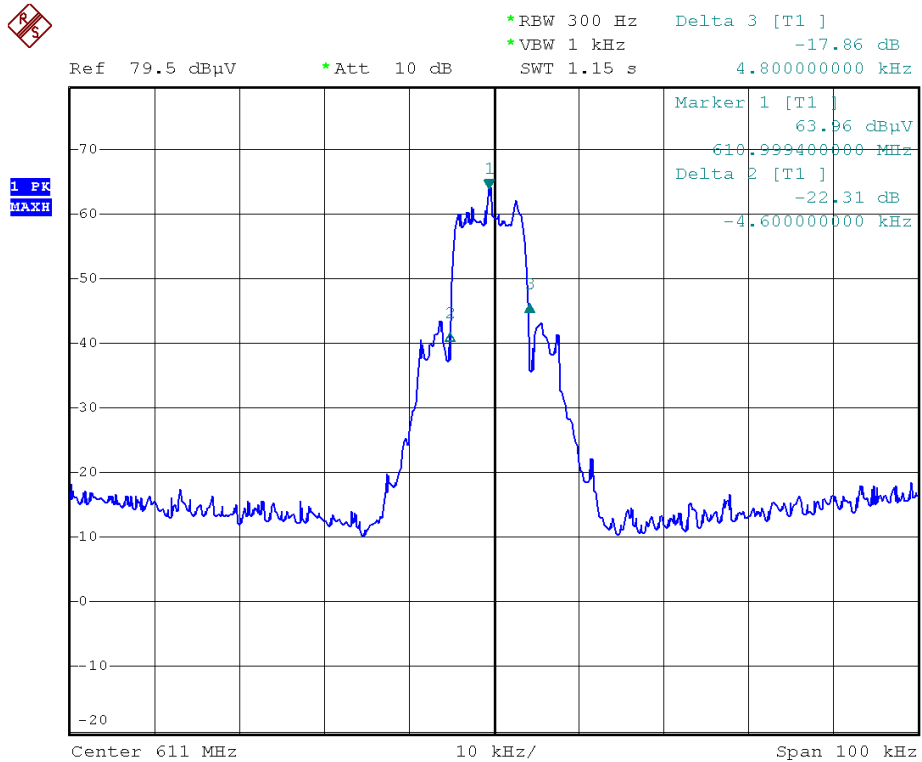


High Frequency =613.7MHz

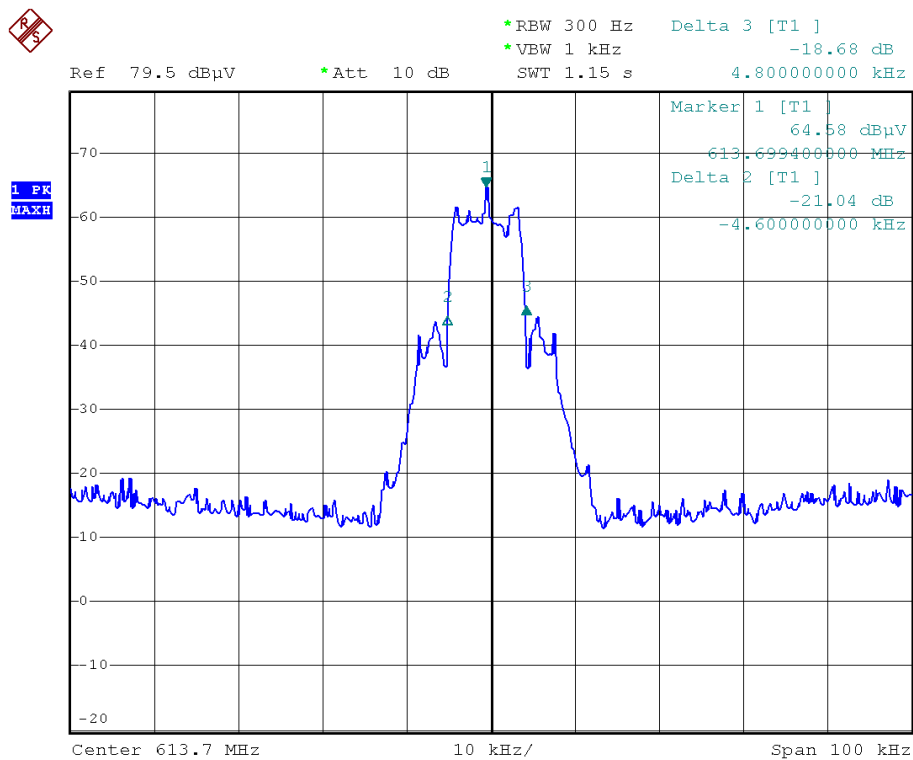
Occupied Bandwidth (Antenna 2)



Low Frequency =608.3MHz



Middle Frequency =611MHz



High Frequency =613.7MHz

2.4 Undesired emissions

2.4.1 Requirement

As per FCC Part 95.1115(b)

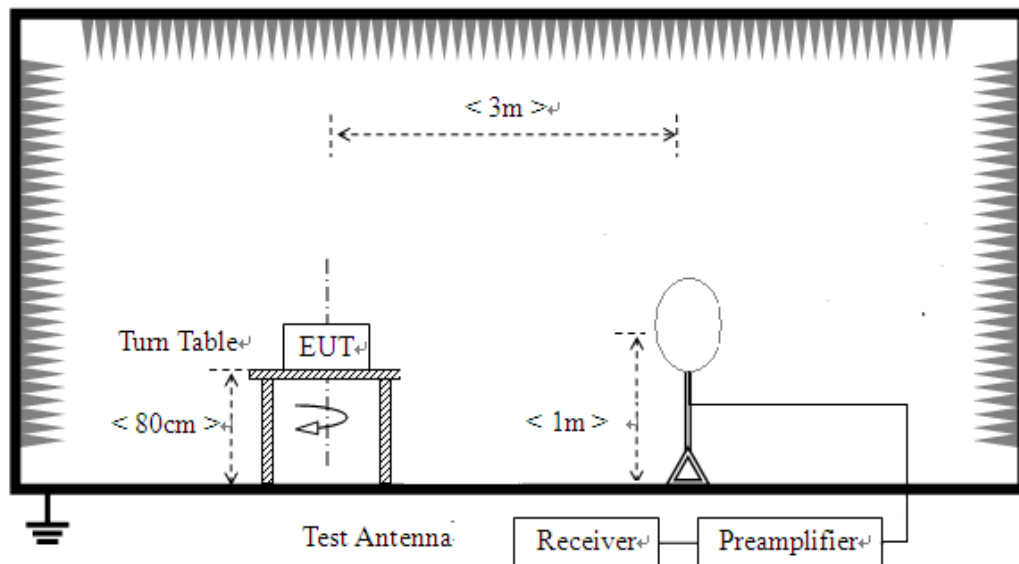
- (1) Out-of-band emissions below 960 MHz are limited to 200 microvolts/meter, as measured at a distance of 3 meters, using measuring instrumentation with a CISPR quasi-peak detector.
- (2) Out-of-band emissions above 960 MHz are limited to 500 microvolts/meter as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth.

2.4.2 Test Description

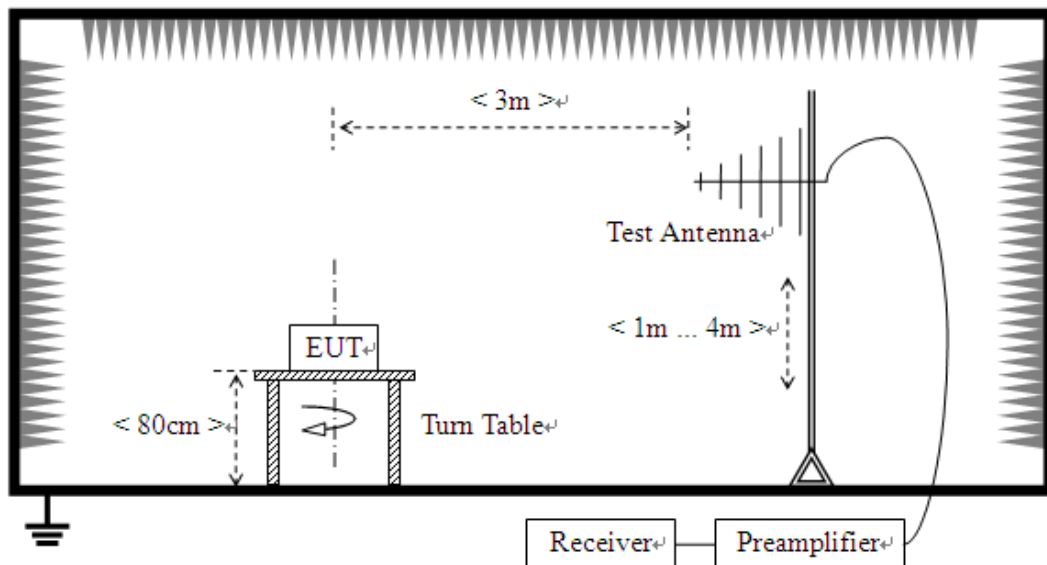
The out of band emission tests were performed in the 3-meter chamber A test site, using the setup accordance with the ANSI / TIA-603-C: 2004. The specification used was the FCC Part 95.1115(b) limits.

Test Setup:

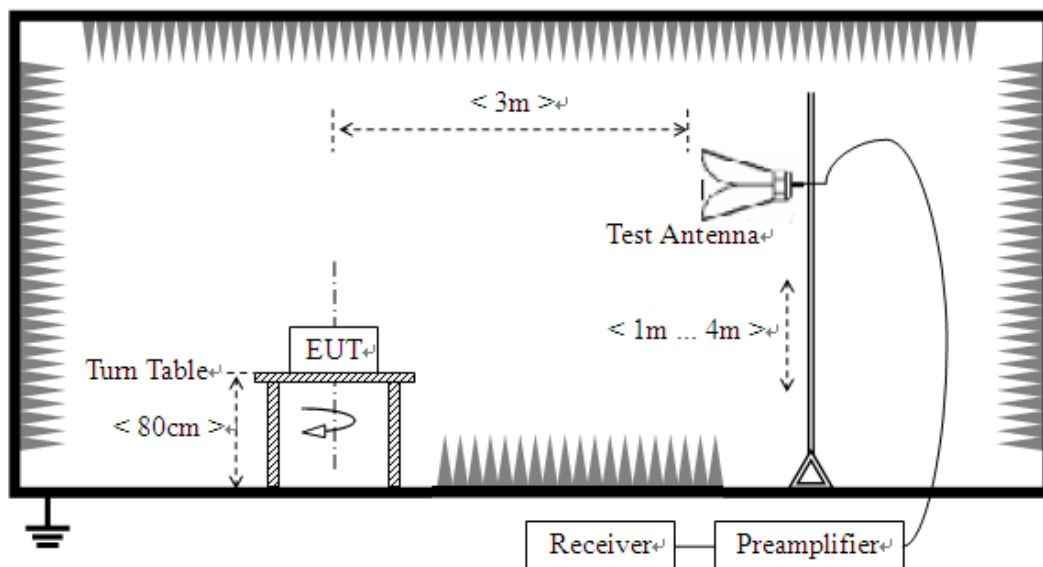
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4:2009. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4:2009.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz). Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested. Measurement bandwidth is 1 MHz above 960 MHz.

A. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
Receiver	R&S	ESIB26	A0304218	2015.06.03	2016.06.02
Full-Anechoic Chamber	Albatross	12.8m*6.8m*6.4m	A0412372	2015.06.03	2016.06.02
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2015.06.03	2016.06.02
Test Antenna - Horn	R&S	BBHA 9120D	9120C-963	2015.06.03	2016.06.02
Test Antenna - Horn	R&S	HF960	100150	2015.06.03	2016.06.02
Test Antenna -Loop	Schwarzbeck	HFH2-Z2	100047	2015.06.03	2016.06.02
Ampilier 1G~18GHz	R&S	MITEQ AFS42-0010 1800	25-S-42	2015.06.03	2016.06.02
amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.03	2016.06.02

2.4.3 Test Result

Antenna 1

Operation Frequency (MHz)	Indicated			Detector PK/QP/AV	FCC Part 95.1115(b)		
	Test Frequency (MHz)	Antenna Polarity	Maximum Reading (dBμ V/m) @3m		Limit (dBμ V/m) @3m	Margin dB	Result
608.3MHz	236.15	Horizontal	31.85	QP	46	14.15	Pass
	236.15	Vertical	30.74	QP	46	15.26	Pass
	296.35	Horizontal	30.57	QP	46	15.43	Pass
	296.35	Vertical	28.75	QP	46	17.25	Pass
	1216.600	Horizontal	39.69	AV	54	14.31	Pass
	1216.600	Vertical	39.84	AV	54	14.16	Pass
	1824.900	Horizontal	41.51	AV	54	12.49	Pass
	1824.900	Vertical	40.82	AV	54	13.18	Pass
	2433.200	Horizontal	41.08	AV	54	12.92	Pass
	2433.200	Vertical	40.27	AV	54	13.73	Pass
611.0MHz	189.48	Horizontal	31.54	QP	46	14.46	Pass
	189.48	Vertical	30.92	QP	46	15.08	Pass
	467.59	Horizontal	30.44	QP	46	15.56	Pass
	467.59	Vertical	29.18	QP	46	16.82	Pass
	1222.000	Horizontal	40.35	AV	54	13.65	Pass
	1222.000	Vertical	39.95	AV	54	14.05	Pass
	1833.000	Horizontal	41.17	AV	54	12.83	Pass
	1833.000	Vertical	40.64	AV	54	13.36	Pass
	2444.000	Horizontal	41.07	AV	54	12.93	Pass
	2444.000	Vertical	40.72	AV	54	13.28	Pass



Operation Frequency (MHz)	Indicated			Detector PK/QP/AV	FCC Part 95.1115(b)		
	Test Frequency (MHz)	Antenna Polarity	Maximum Reading (dBμV/m) @3m		Limit (dBμV/m) @3m	Margin dB	Result
613.7MHz	150.157	Horizontal	30.78	QP	46	15.22	Pass
	150.157	Vertical	30.54	QP	46	15.46	Pass
	350.267	Horizontal	30.27	QP	46	15.73	Pass
	350.267	Vertical	30.19	QP	46	15.81	Pass
	1227.400	Horizontal	40.24	AV	54	13.76	Pass
	1227.400	Vertical	40.07	AV	54	13.93	Pass
	1841.100	Horizontal	41.21	AV	54	12.79	Pass
	1841.100	Vertical	40.39	AV	54	13.61	Pass
	2454.800	Horizontal	41.40	AV	54	12.60	Pass
	2454.800	Vertical	40.28	AV	54	13.72	Pass

Antenna 2

Operation Frequency (MHz)	Indicated			Detector PK/QP/AV	FCC Part 95.1115(b)		
	Test Frequency (MHz)	Antenna Polarity	Maximum Reading (dBμV/m) @3m		Limit (dBμV/m) @3m	Margin dB	Result
608.3MHz	138.497	Horizontal	31.42	QP	46	14.58	Pass
	138.497	Vertical	31.24	QP	46	14.76	Pass
	356.798	Horizontal	31.05	QP	46	14.95	Pass
	356.798	Vertical	31.23	QP	46	14.77	Pass
	1216.600	Horizontal	40.57	AV	54	13.43	Pass
	1216.600	Vertical	40.24	AV	54	13.76	Pass
	1824.900	Horizontal	41.37	AV	54	12.63	Pass
	1824.900	Vertical	40.89	AV	54	13.11	Pass
	2433.200	Horizontal	41.45	AV	54	12.55	Pass
	2433.200	Vertical	40.77	AV	54	13.23	Pass



Operation Frequency (MHz)	Indicated			Detector PK/QP/AV	FCC Part 95.1115(b)		
	Test Frequency (MHz)	Antenna Polarity	Maximum Reading (dBμV/m) @3m		Limit (dBμV/m) @3m	Margin dB	Result
611.0MHz	189.674	Horizontal	31.49	QP	46	14.51	Pass
	189.674	Vertical	30.93	QP	46	15.07	Pass
	636.495	Horizontal	31.23	QP	46	14.77	Pass
	636.495	Vertical	30.82	QP	46	15.18	Pass
	1222.000	Horizontal	40.42	AV	54	13.58	Pass
	1222.000	Vertical	40.17	AV	54	13.83	Pass
	1833.000	Horizontal	41.35	AV	54	12.65	Pass
	1833.000	Vertical	40.86	AV	54	13.14	Pass
	2444.000	Horizontal	41.84	AV	54	12.16	Pass
	2444.000	Vertical	41.21	AV	54	13.79	Pass
613.7MHz	218.347	Horizontal	31.76	QP	46	14.24	Pass
	218.347	Vertical	31.27	QP	46	14.73	Pass
	545.267	Horizontal	31.16	QP	46	14.84	Pass
	545.267	Vertical	30.88	QP	46	15.12	Pass
	1227.400	Horizontal	40.32	AV	54	13.68	Pass
	1227.400	Vertical	40.15	AV	54	13.85	Pass
	1841.100	Horizontal	41.19	AV	54	12.81	Pass
	1841.100	Vertical	40.76	AV	54	13.24	Pass
	2454.800	Horizontal	41.57	AV	54	12.43	Pass
	2454.800	Vertical	40.82	AV	54	13.18	Pass

2.5 Frequency Stability

2.5.1 Requirement

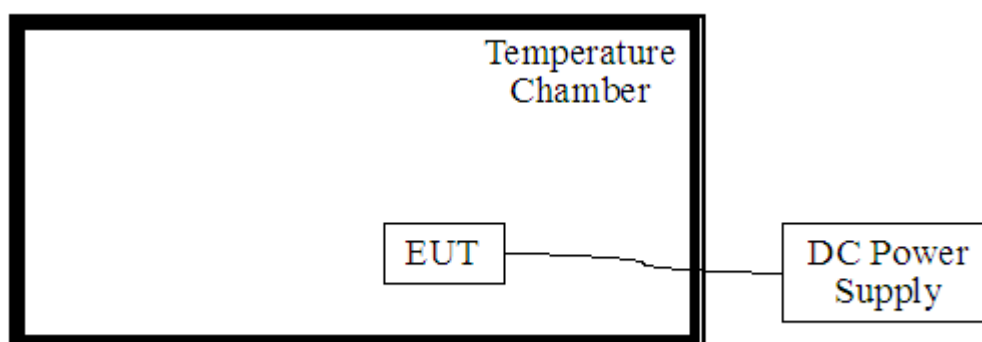
As per FCC Part 95.1115(e)

Frequency stability. Manufacturers of wireless medical telemetry devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all of the manufacturer's specified conditions.

The manufacturer specifies a temperature range of -30°C to 50 °C.

2.5.2 Test Description

1. Test Setup:



2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Data	Cal. Due Data
DC Power Supply	Good Will	GPS-3030D D	EF920938	2015.06.03	2016.06.02
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2015.06.03	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.03	2016.06.02

The nominal, highest and lowest extreme voltages are separately 3.7VDC, 5.4VDC and 2.7VDC, which are specified by the applicant; the normal temperature here used is 25°C.

2.5.3 Test Result

608.3MHz

Test Conditions					Verdict
Power (VDC)	Temperature (°C)	Frequency error (Hz)	Measured Frequency (MHz)	Limit	
3.7	-30	300	608.2997	$\geq 608\text{MHz}$	PASS
	-20	200	608.2998		
	-10	400	608.2996		
	0	500	608.2995		
	+10	600	608.2994		
	+20	500	608.2995		
	+30	600	608.2994		
	+40	500	608.2995		
	+50	700	608.2993		
5.4	+25	500	608.2995		
2.7	+25	400	608.2996		

613.7MHz

Test Conditions					Verdict
Power (VDC)	Temperature (°C)	Frequency error (Hz)	Measured Frequency (MHz)	Limit	
3.7	-30	400	613.6996	$\leq 614\text{MHz}$	PASS
	-20	500	613.9995		
	-10	600	613.6996		
	0	600	613.6994		
	+10	500	613.6995		
	+20	700	613.6993		
	+30	600	613.6994		
	+40	800	613.6995		
	+50	300	613.6997		
5.4	+25	800	613.6995		
2.7	+25	500	613.6995		

**** END OF REPORT ****