

TEST REPORT

Reference No...... : WTS20S05028697W001
FCC ID : ZLZ-WMTSTM70
Applicant..... : Shenzhen Mindray BIO-Medical electronics Co.,LTD.
Address..... : Mindray Building, Keji 12th Road South, Hi-tech Ind, Shenzhen, China
Manufacturer : The same as above
Address..... : The same as above
Product..... : Telemetry Monitor
Model(s) : TM70
Brand Name : Mindray
Standards..... : FCC CFR47 Part 95 Subpart H
Date of Receipt sample : 2020-05-19
Date of Test : 2019-05-20 to 2020-05-21
Date of Issue..... : 2020-05-22
Test Result..... : **Pass**

Remark : This report is based on WTS19S09066147W001 V1 for updated the antenna information, Field Strength of Fundamental and Field Strength of Spurious Emissions.

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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2 Contents

	Page
1 COVER PAGE.....	1
2 CONTENTS	2
3 REVISION HISTORY	3
4 GENERAL INFORMATION.....	4
4.1 GENERAL DESCRIPTION OF E.U.T.	4
4.2 DETAILS OF E.U.T.	4
4.3 TEST MODE	5
5 TEST SUMMARY	6
6 TEST FACILITY	7
7 EQUIPMENT USED DURING TEST	8
7.1 EQUIPMENTS LIST	8
7.2 MEASUREMENT UNCERTAINTY	8
7.3 TEST EQUIPMENT CALIBRATION	8
8 FIELD STRENGTH OF FUNDAMENTAL.....	9
8.1 EUT OPERATION.....	9
8.2 TEST PROCEDURE	9
8.3 TEST LIMITS	9
8.4 TEST RESULT	10
9 FIELD STRENGTH OF SPURIOUS EMISSIONS	11
9.1 EUT OPERATION.....	11
9.2 TEST SETUP	11
9.3 SPECTRUM ANALYZER SETUP	13
9.4 TEST PROCEDURE	14
9.5 SUMMARY OF TEST RESULTS	15
10 RF EXPOSURE.....	17
11 PHOTOGRAPHS OF TEST SETUP AND EUT.....	18

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS20S05028 697W001	2020-05-19	2019-05-20 to 2020-05-21	2020-05-22	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Telemetry Monitor
Model(s):	TM70
Model Description:	N/A
Support:	WMTS
Hardware Version:	1.0
Software Version:	1.0

4.2 Details of E.U.T.

Operation Frequency:	608MHz(608-614MHz) 1.4GHz(1395-1400MHz) 1.4GHz(1427-1432MHz)
Max. RF output power:	608MHz: 102.06 dBu/m ,1.4GHz: 93.78 dBu/m
Type of Modulation:	GFSK
Antenna installation:	WMTS: External antenna
Ratings:	DC 3.8V 3800mA

4.3 Test Mode

All channels and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Support Band	Channel Frequency
608-614MHz	608.66 MHz
	611.06 MHz
	613.46 MHz
1395-1400MHz and 1427-1432 MHz(wide band)	1395.5 MHz
	1399.5 MHz
	1431.5 MHz
1395-1400MHz and 1427-1432 MHz(narrow band)	1395.4 MHz
	1399.6 MHz
	1431.6 MHz

5 Test Summary

Test Items	Test Requirement	Result
FIELD STRENGTH OF FUNDAMENTAL	95.2369(a)(b)	PASS
FIELD STRENGTH OF SPURIOUS EMISSIONS	95.2379(a)(b)	PASS

6 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Services(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 number 523476, September 10, 2019.

7 Equipment Used during Test

7.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2020-04-20	2020-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2020-04-20	2020-04-19
3	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2020-04-20	2020-04-19
4	Amplifier	Agilent	8447D	2944A10178	2020-04-20	2020-04-19
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2020-04-25	2020-04-24
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2020-04-20	2020-04-19
7	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	2020-04-20	2020-04-19
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2019-04-20	2020-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2019-05-24	2020-05-23
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2019-04-19	2020-04-18
4	Cable	HUBER+SUHNER	CBL2	525178	2019-04-20	2020-04-19
5	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2020-04-20	2020-04-19

7.2 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64 dB(AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10 ⁻⁷ Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval: 95%. Confidence factor:k=2	

7.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

8 FIELD STRENGTH OF FUNDAMENTAL

Test Requirement:	95.2369(a)(b)
Test Method:	ANSI/TIA-603-E-2016
Test Mode:	TX transmitting

8.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.4 % RH
Atmospheric Pressure:	101.4kPa

8.2 Test Procedure

Radiated method:

1. The setup of EUT is according with per TIA/EIA/EIA Standard 603-C.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

8.3 Test limits

(a) For WMTS transmitter types operating in the 608-614 MHz band, the field strength of the transmitted signal must not exceed 200 mV/m, measured at a distance of 3 meters, using instrumentation with a CISPR quasi-peak detector.

(b) For WMTS transmitter types operating in the 1395-1400 MHz and 1427-1432 MHz bands, the field strength of the transmitted signal must not exceed 740 mV/m, measured at 3 meters, using instrumentation with an averaging detector and a 1MHz reference bandwidth.

8.4 Test Result

FIELD STRENGTH OF FUNDAMENTAL

Test channels(MHz)	Field Strength(dBuv/m)	limits(dBuv/m)	Result
608.66 MHz	102.06	106	PASS
611.06 MHz	100.33	106	PASS
613.46 MHz	101.76	106	PASS
1395.5 MHz(WB)	91.17	117.4	PASS
1399.5 MHz(WB)	92.85	117.4	PASS
1431.5 MHz(WB)	93.78	117.4	PASS
1395.4 MHz(NB)	90.15	117.4	PASS
1399.6 MHz(NB)	90.59	117.4	PASS
1431.6 MHz(NB)	91.53	117.4	PASS

9 FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Requirement:	95.2379(a)(b)
Test Method:	ANSI/TIA-603-E-2016
Test Mode:	TX transmitting

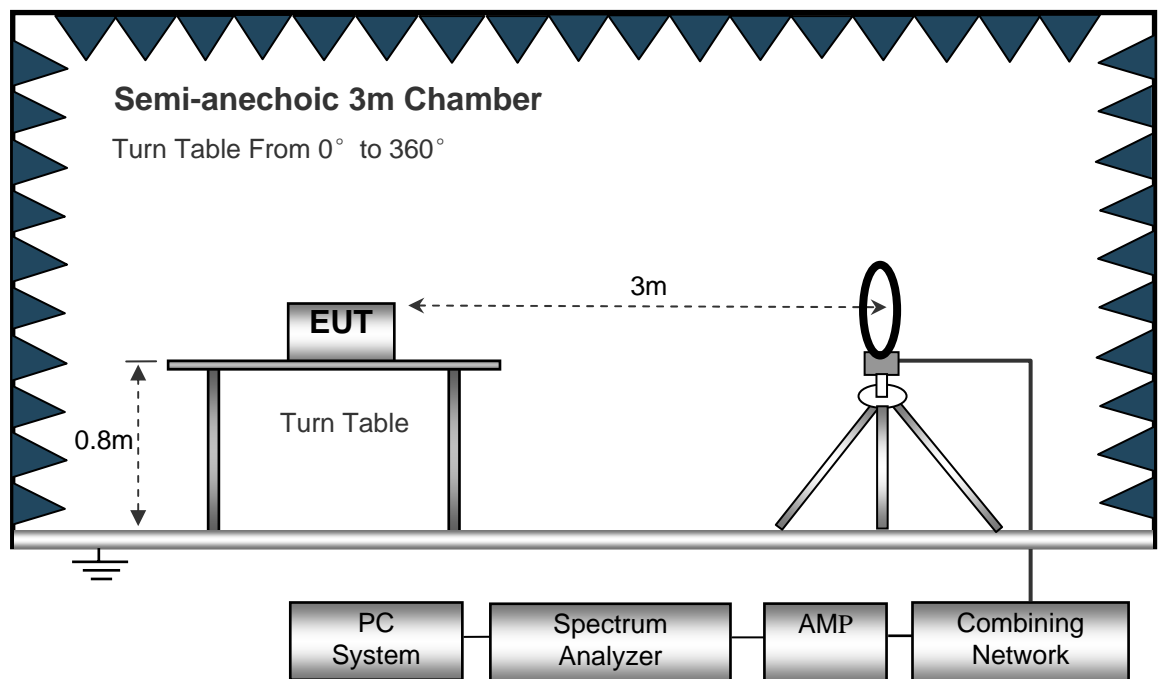
9.1 EUT Operation

Operating Environment :

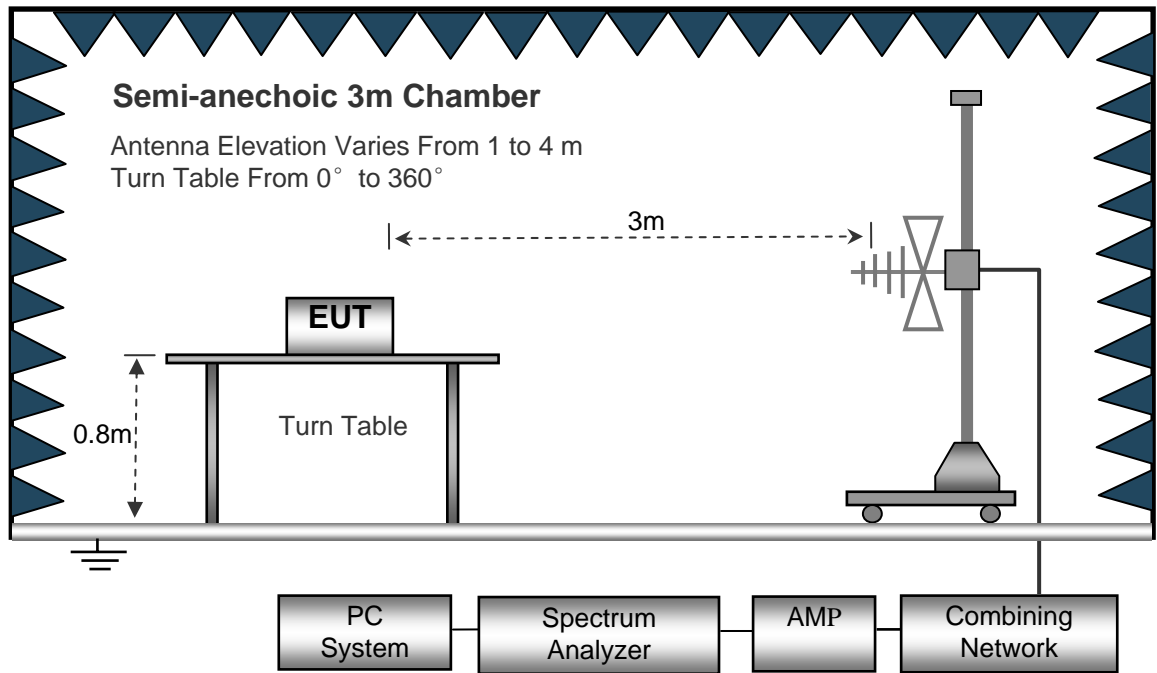
Temperature:	23.5 °C
Humidity:	52.5% RH
Atmospheric Pressure:	101.5kPa

9.2 Test Setup

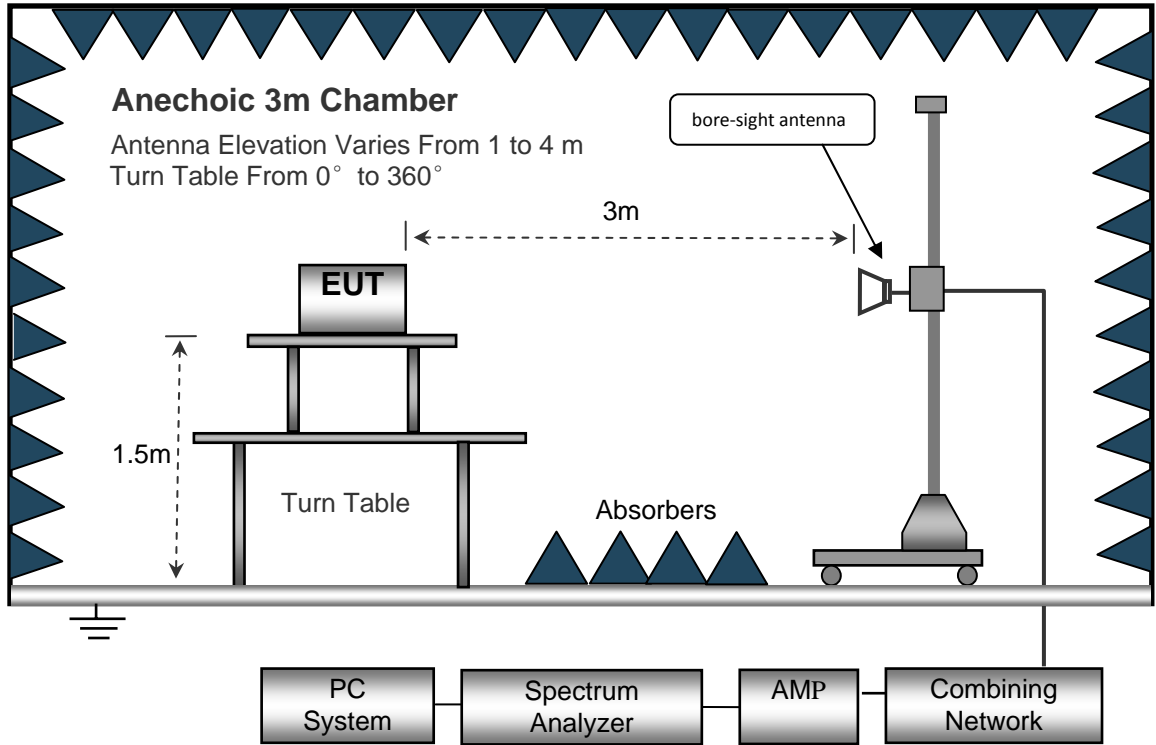
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz
 Detector QP.
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 3MHz
 Detector Ave.
 Resolution Bandwidth..... 1MHz
 Video Bandwidth..... 3MHz

9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m for below 1GHz and 1.5m for above 1GHz above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.
7. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.
Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level
Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$
8. Repeat above procedures until the measurements for all frequencies are completed.

9.5 Summary of Test Results

For 26MHz~30MHz,

The measurements were more than 20 dB below the limit and not reported.

Remark: Test performed from 30MHz to 10th harmonics with low/middle/high channels, only the worst data were recorded.

Middle channel(1399.5MHz WB)

Freq (MHz)	Reading (dBuv/m)	Factor (dB)	Polar (V/H)	Result (dBuv/m)	Limit (dBuv/m)	Margin (dB)	Detector
152.2200	39.20	-16.85	V	22.35	46.00	-21.15	QP
810.8500	33.28	0.01	V	33.29	46.00	-12.71	QP
211.3900	44.49	-12.63	H	31.86	46.00	-11.64	QP
810.8500	35.61	0.01	H	35.62	46.00	-10.38	QP
3240.000	32.32	-9.28	V	23.04	54.00	-30.96	AV
5830.000	30.27	-1.09	V	29.18	54.00	-24.82	AV
2799.000	32.73	-7.20	H	25.53	54.00	-28.47	AV
4198.500	37.30	-4.60	H	32.70	54.00	-21.30	AV

Middle channel(1399.6MHz NB)

Freq (MHz)	Reading (dBuv/m)	Factor (dB)	Polar (V/H)	Result (dBuv/m)	Limit (dBuv/m)	Margin (dB)	Detector
211.5265	32.80	-17.59	V	20.09	46.00	-28.29	QP
631.6884	35.23	-7.33	V	27.90	46.00	-18.10	QP
197.8100	44.47	-13.27	H	31.20	46.00	-12.30	QP
651.7700	33.41	-2.67	H	30.74	46.00	-15.26	QP
5158.000	30.17	-0.26	V	29.91	54.00	-24.09	AV
8336.000	32.23	2.48	V	34.71	54.00	-19.29	AV
4486.000	31.24	-4.04	H	27.20	54.00	-26.80	AV
6978.000	30.35	2.06	H	32.41	54.00	-21.59	AV

Low channel(608.66MHz)

Freq (MHz)	Reading (dBuv/m)	Factor (dB)	Polar (V/H)	Result (dBuv/m)	Limit (dBuv/m)	Margin (dB)	Detector
159.9800	49.25	-16.11	V	33.14	46.00	-10.36	QP
450.0100	38.45	-7.45	V	31.00	46.00	-15.00	QP
159.9800	46.82	-16.11	H	30.71	46.00	-12.79	QP
450.0100	43.04	-7.45	H	35.59	46.00	-10.41	QP
5176.000	30.94	-0.33	V	30.61	54.00	-23.39	AV
6574.000	28.99	1.17	V	30.16	54.00	-23.84	AV
3082.000	29.23	-6.78	H	22.45	54.00	-31.55	AV
4972.000	32.88	-2.45	H	30.43	54.00	-23.57	AV

Note: Margin = Limit-Result

10 RF Exposure

Remark: refer to MPE test report: WTS20S05028697W002

11 Photographs of test setup and EUT.

Note: Please refer to appendix TM70-Photo.

===== End of Report =====