

TEST REPORT

Reference No..... : WTX21X02013773W-1
FCC ID : 2ASJH-RVTYR201
Applicant : Setec BMPRO Pty Ltd.
Address : 19 Henderson Rd, Knoxfield, Victoria 3180, Australia
Product Name : SmartPressure Sensor
Test Model. : RVTYR201
Standards : FCC Part 15.249
Date of Receipt sample : Feb.26, 2021
Date of Test..... : Feb.26, 2021 to Apr.14, 2021
Date of Issue : Apr.14, 2021
Test Result..... : **Pass**

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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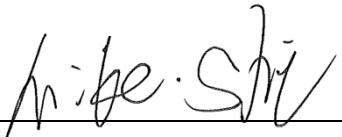
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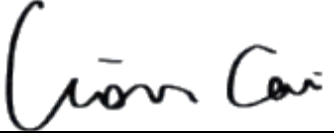
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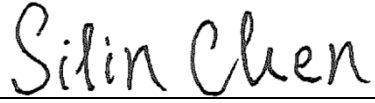

Silin Chen / Manager

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
1.2 TEST STANDARDS.....	5
1.3 TEST METHODOLOGY.....	5
1.4 TEST FACILITY	5
1.5 EUT SETUP AND TEST MODE.....	6
1.6 MEASUREMENT UNCERTAINTY	7
1.7 TEST EQUIPMENT LIST AND DETAILS	8
2. SUMMARY OF TEST RESULTS	10
3. ANTENNA REQUIREMENTS.....	11
3.1 STANDARD APPLICABLE.....	11
3.2 TEST RESULT.....	11
4. RADIATED EMISSIONS.....	12
4.1 STANDARD APPLICABLE.....	12
4.2 TEST PROCEDURE.....	12
4.3 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	14
4.4 SUMMARY OF TEST RESULTS/PLOTS	14
5. OUT OF BAND EMISSIONS.....	19
5.1 STANDARD APPLICABLE.....	19
5.2 TEST PROCEDURE.....	19
5.3 SUMMARY OF TEST RESULTS/PLOTS	19
6. EMISSION BANDWIDTH.....	22
6.1 STANDARD APPLICABLE.....	22
6.2 TEST PROCEDURE.....	22
6.3 SUMMARY OF TEST RESULTS/PLOTS	22
7. CONDUCTED EMISSIONS	24
7.1 TEST PROCEDURE.....	24
7.2 BASIC TEST SETUP BLOCK DIAGRAM.....	24
7.3 TEST RECEIVER SETUP	24
7.4 SUMMARY OF TEST RESULTS/PLOTS	24
APPENDIX PHOTOGRAPHS.....	25

Report version

Version No.	Date of issue	Description
Rev.00	Apr.14, 2021	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Setec BMPRO Pty Ltd.
Address of applicant: 19 Henderson Rd, Knoxfield, Victoria 3180, Australia

Manufacturer: Shenzhen Yiguo Electronic Technology Co., Ltd
Address of manufacturer: 3 / F, building 10, jiyada Science Park, Minsheng 3rd road, Liaokeng village, Shiyan Town, Bao'an District, Shenzhen

General Description of EUT	
Product Name:	SmartPressure Sensor
Trade Name:	BMPRO
Model No.:	RVTYR201
Adding Model(s):	/
Rated Voltage:	Battery:DC3V
Battery Capacity	/
Power Adapter Model:	/
Software Version:	senasic_app_snp729_V02
Hardware Version:	V05
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2402MHz-2480MHz
Max. Field Strength:	56.11dBuV/m
Modulation:	GFSK
Quantity of Channels:	3
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (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. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2402MHz
TM2	Middle Channel	2426MHz
TM3	High Channel	2480MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-26GHz $\pm 3.92\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2020-04-28	2021-04-27
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2020-04-28	2021-04-27
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2020-04-28	2021-04-27
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2020-04-28	2021-04-27
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2020-04-28	2021-04-27
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2020-04-28	2021-04-27
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2020-04-28	2021-04-27
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2020-04-28	2021-04-27
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2020-04-28	2021-04-27
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2020-04-28	2021-04-27
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2020-04-28	2021-04-27
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2020-04-28	2021-04-27
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2020-04-28	2021-04-27
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2020-04-28	2021-04-27
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	N/A
§15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215(c)	Emission Bandwidth	Compliant

N/A: Not applicable

3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an Integral antenna, fulfill the requirement of this section.

4. Radiated Emissions

4.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

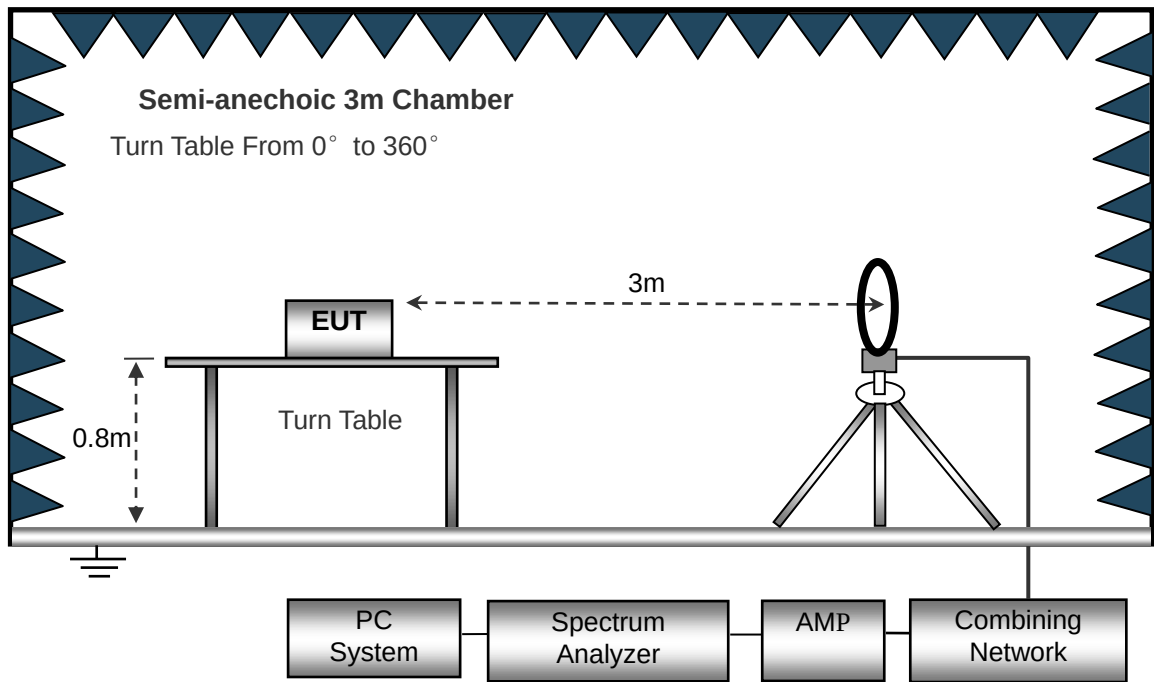
4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

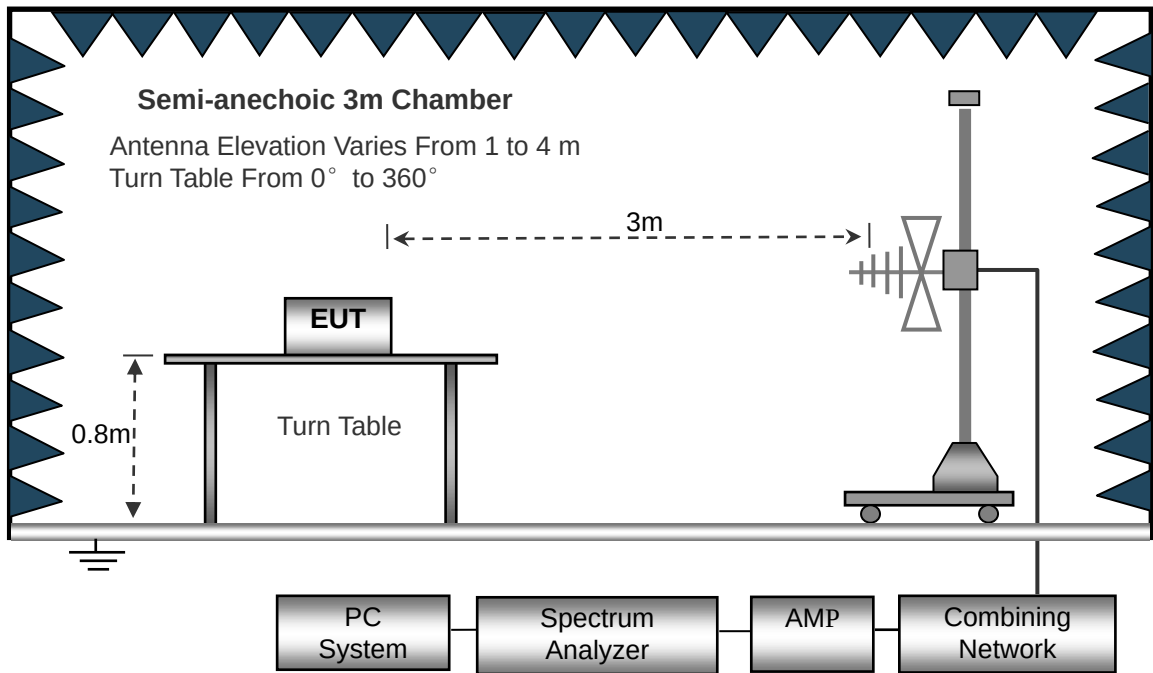
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

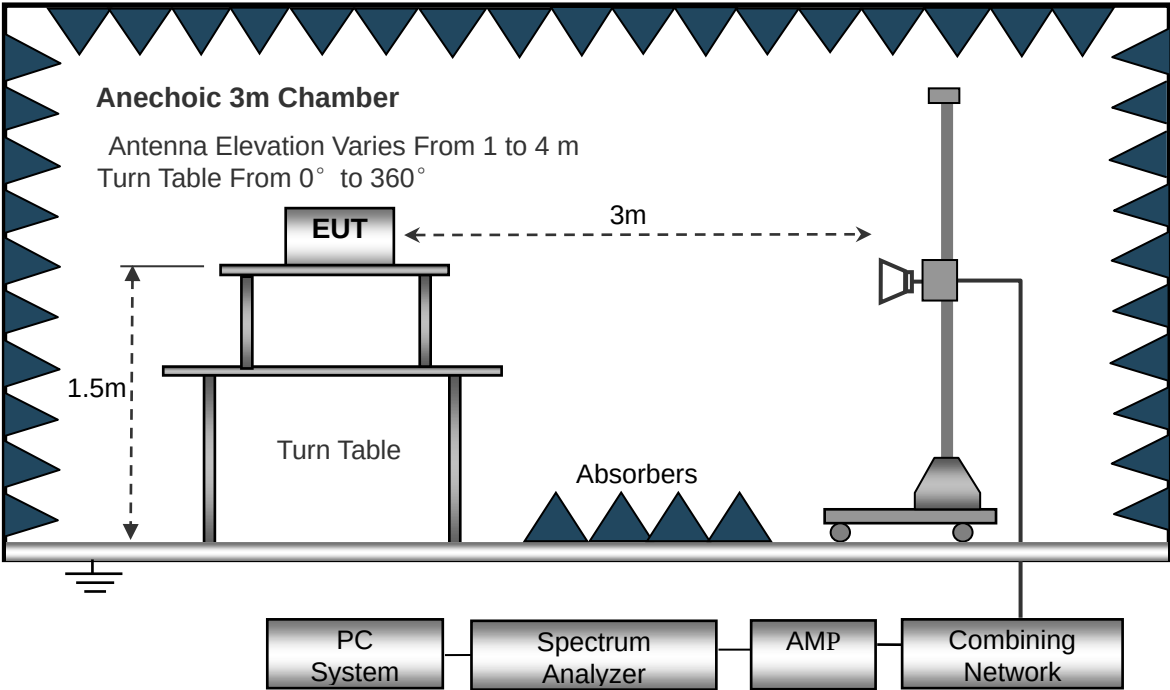
The test setup for emission measurement below 30MHz..



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



The test setup for emission measurement above 1 GHz..



Frequency :9kHz-30MHz
RBW=10KHz,
VBW =30KHz
Sweep time= Auto
Trace = max hold
Detector function = peak

Frequency :30MHz-1GHz
RBW=120KHz,
VBW=300KHz
Sweep time= Auto
Trace = max hold
Detector function = peak, QP

Frequency :Above 1GHz
RBW=1MHz,
VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto
Trace = max hold
Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

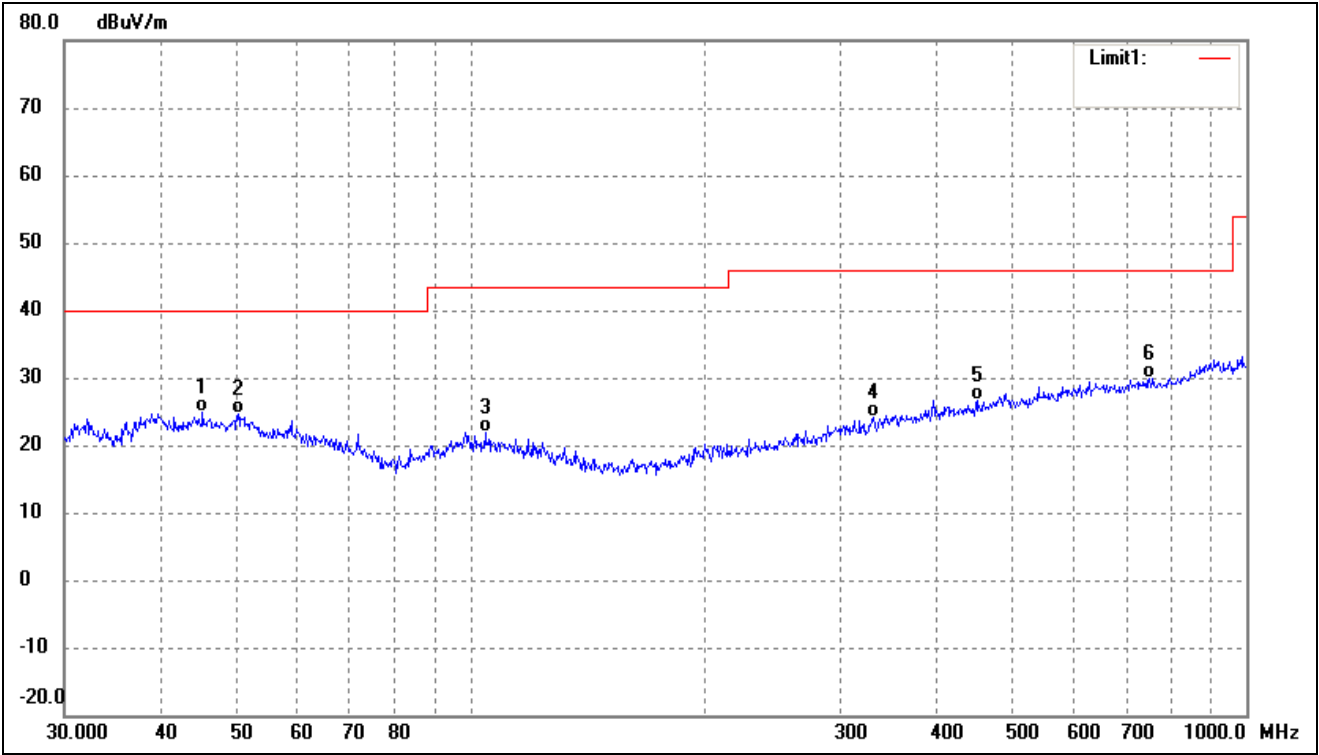
Margin = Corr. Ampl. – FCC Part 15C Limit

4.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

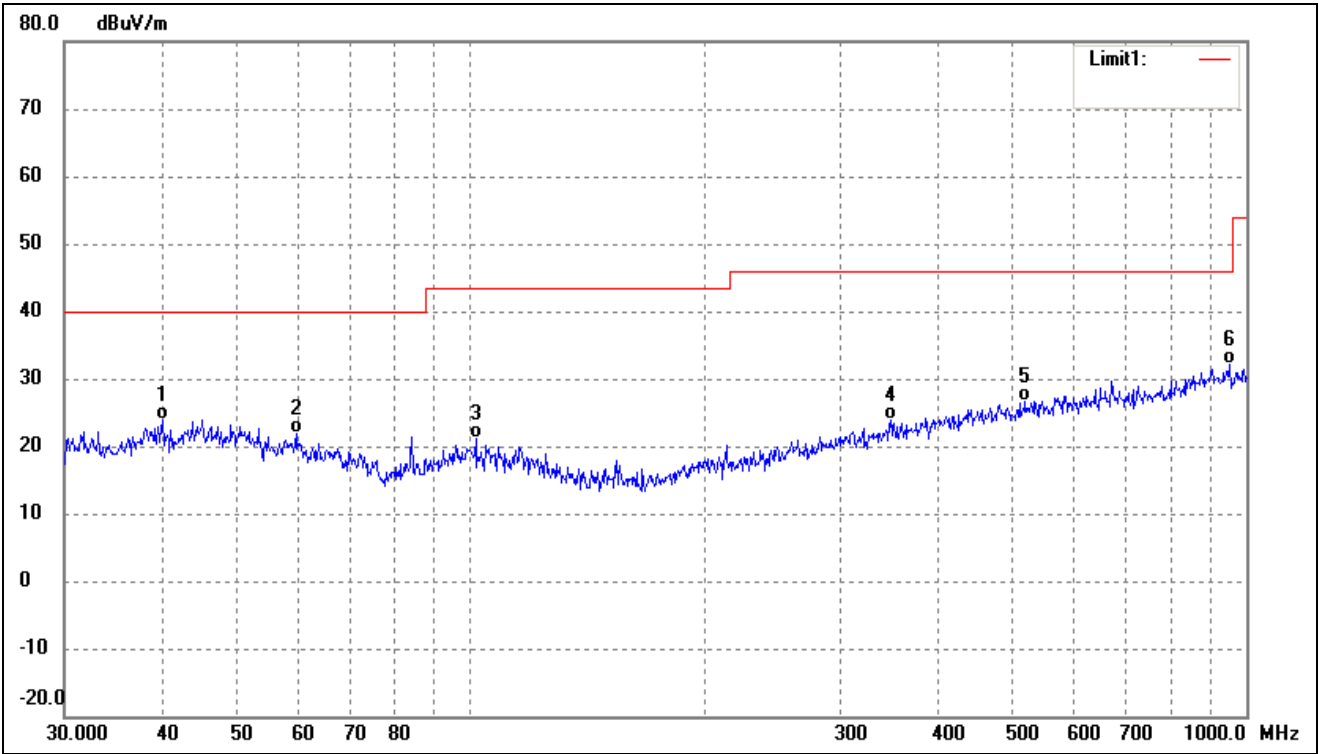
➤ Spurious Emissions Below 1GHz

Test Channel	TX	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	45.2166	36.76	-11.79	24.97	40.00	-15.03	-	-	QP
2	50.2325	36.32	-11.60	24.72	40.00	-15.28	-	-	QP
3	104.5361	35.22	-13.32	21.90	43.50	-21.60	-	-	QP
4	331.3547	32.76	-8.57	24.19	46.00	-21.81	-	-	QP
5	449.5558	32.12	-5.59	26.53	46.00	-19.47	-	-	QP

Test Channel	TX	Polarity:	Vertical
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	40.1347	35.81	-11.98	23.83	40.00	-16.17	-	-	QP
2	59.6493	34.78	-12.98	21.80	40.00	-18.20	-	-	QP
3	101.6443	34.51	-13.32	21.19	43.50	-22.31	-	-	QP
4	348.0274	31.33	-7.55	23.78	46.00	-22.22	-	-	QP
5	519.0649	30.82	-4.15	26.67	46.00	-19.33	-	-	QP
6	952.0937	30.78	1.37	32.15	46.00	-13.85	-	-	QP

Remark: ‘-’Means’ the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

➤ *Spurious Emissions Above 1GHz*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2404MHz							
2402	64.94	-9.47	55.45	114	-58.55	H	PK
2402	63.17	-9.47	53.70	94	-40.30	H	AV
4804	53.26	-4.52	48.74	74	-25.26	H	PK
4804	44.37	-4.52	39.85	54	-14.15	H	AV
7206	56.18	-2.20	53.98	74	-20.02	H	PK
7206	47.06	-2.20	44.86	54	-9.14	H	AV
2402	59.97	-9.47	50.50	114	-63.50	V	PK
2402	59.39	-9.47	49.92	94	-44.08	V	AV
4804	53.32	-4.52	48.80	74	-25.20	V	PK
4804	42.51	-4.52	37.99	54	-16.01	V	AV
7206	55.77	-2.20	53.57	74	-20.43	V	PK
7206	45.25	-2.20	43.05	54	-10.95	V	AV
Middle Channel-2426MHz							
2426	65.53	-9.42	56.11	114	-57.89	H	PK
2426	62.68	-9.42	53.26	94	-40.74	H	AV
4852	53.86	-4.49	49.37	74	-24.63	H	PK
4852	41.74	-4.49	37.25	54	-16.75	H	AV
7278	55.62	-2.18	53.44	74	-20.56	H	PK
7278	46.69	-2.18	44.51	54	-9.49	H	AV
2426	59.23	-9.42	49.81	114	-64.19	V	PK
2426	60.09	-9.42	50.67	94	-43.33	V	AV
4852	50.79	-4.49	46.30	74	-27.70	V	PK
4852	43.47	-4.49	38.98	54	-15.02	V	AV
7278	56.10	-2.18	53.92	74	-20.08	V	PK
7278	45.63	-2.18	43.45	54	-10.55	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
High Channel-2480MHz							
2480	64.97	-9.32	55.65	114	-58.35	H	PK
2480	62.8	-9.32	53.48	94	-40.52	H	AV
4960	53.32	-4.41	48.91	74	-25.09	H	PK
4960	44.45	-4.41	40.04	54	-13.96	H	AV
7440	55.83	-2.14	53.69	74	-20.31	H	PK
7440	45.25	-2.14	43.11	54	-10.89	H	AV
2480	60.50	-9.32	51.18	114	-62.82	V	PK
2480	59.45	-9.32	50.13	94	-43.87	V	AV
4960	50.75	-4.41	46.34	74	-27.66	V	PK
4960	43.40	-4.41	38.99	54	-15.01	V	AV
7440	54.08	-2.14	51.94	74	-22.06	V	PK
7440	43.74	-2.14	41.60	54	-12.40	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz..

5. Out of Band Emissions

5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

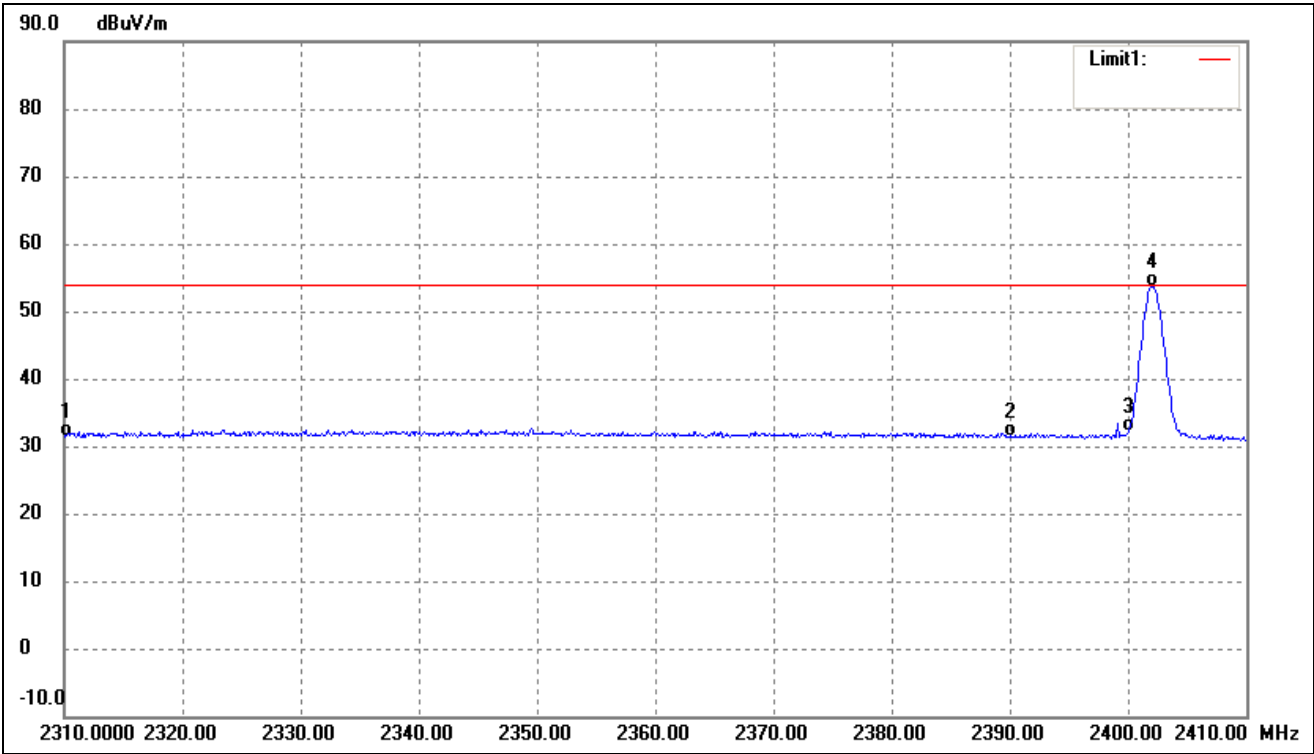
5.3 Summary of Test Results/Plots

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	<54 dBuV	Pass
Highest	2483.50	<54 dBuV	Pass
	2500.00	<54 dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

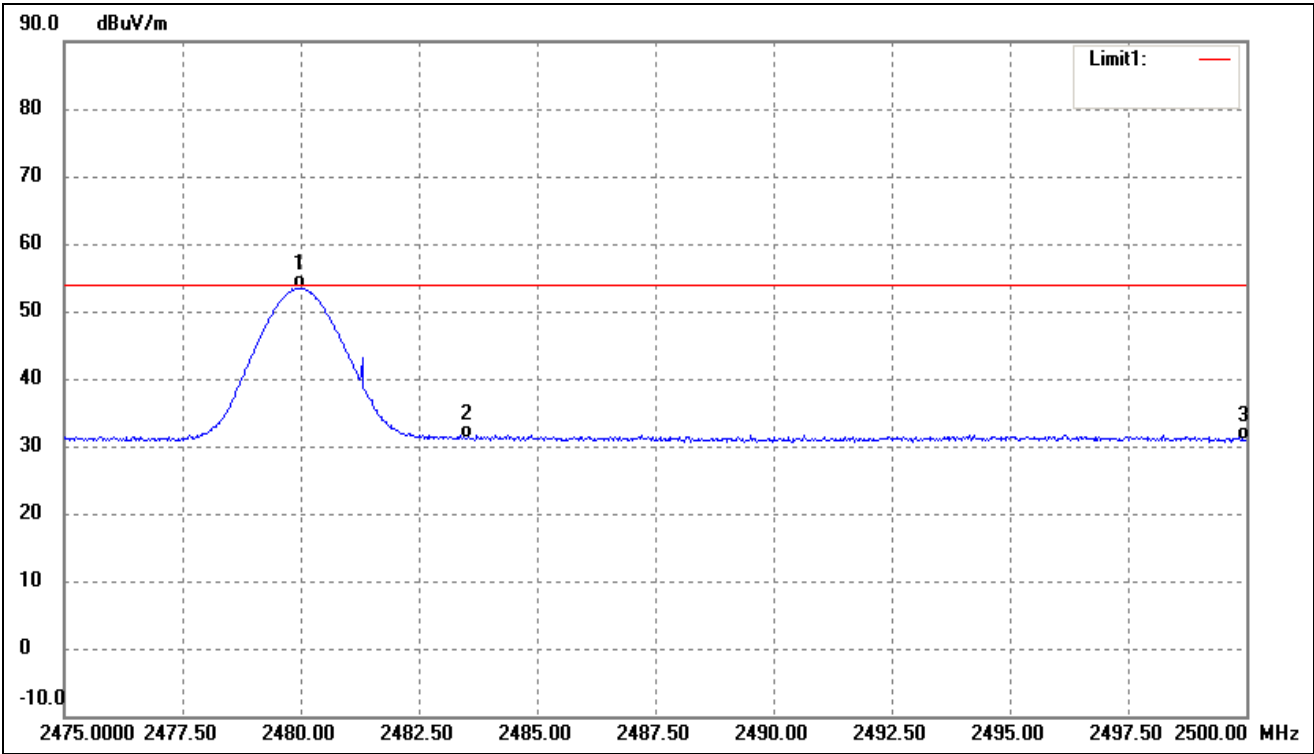
Please refer to the test plots as below.

Test Channel	Low	Polarity:	Horizontal (worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	41.09	-9.66	31.43	54.00	-22.57	Ave Detector
	2310.000	52.80	-9.66	43.14	74.00	-30.86	Peak Detector
2	2390.000	40.78	-9.50	31.28	54.00	-22.72	Ave Detector
	2390.000	52.59	-9.50	43.09	74.00	-30.91	Peak Detector
3	2400.000	41.69	-9.48	32.21	54.00	-21.79	Ave Detector
	2400.000	53.28	-9.48	43.80	74.00	-30.20	Peak Detector
4	2402.100	63.17	-9.47	53.70	54.00	-0.30	Ave Detector
	2401.900	64.94	-9.48	55.46	74.00	-18.54	Peak Detector

Test Channel	High	Polarity:	Horizontal (worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.975	62.80	-9.32	53.48	54.00	-0.52	Ave Detector
	2480.025	64.97	-9.32	55.65	74.00	-18.35	Peak Detector
2	2483.500	40.51	-9.31	31.20	54.00	-22.80	Ave Detector
	2483.500	51.51	-9.31	42.20	74.00	-31.80	Peak Detector
3	2500.000	40.19	-9.28	30.91	54.00	-23.09	Ave Detector
	2500.000	51.71	-9.28	42.43	74.00	-31.57	Peak Detector

6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = 1MHz, centered on a transmitting channel

RBW $\geq$ 1% 20dB Bandwidth, VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

6.3 Summary of Test Results/Plots

Test Channel	Frequency MHz	20dB Bandwidth kHz
Low Channel	2402	28.20
Middle Channel	2426	41.00
High Channel	2480	31.80

Please refer to the following test plots

Waltek Testing Group (Shenzhen) Co., Ltd.
<http://www.semtest.com.cn>

7. Conducted Emissions

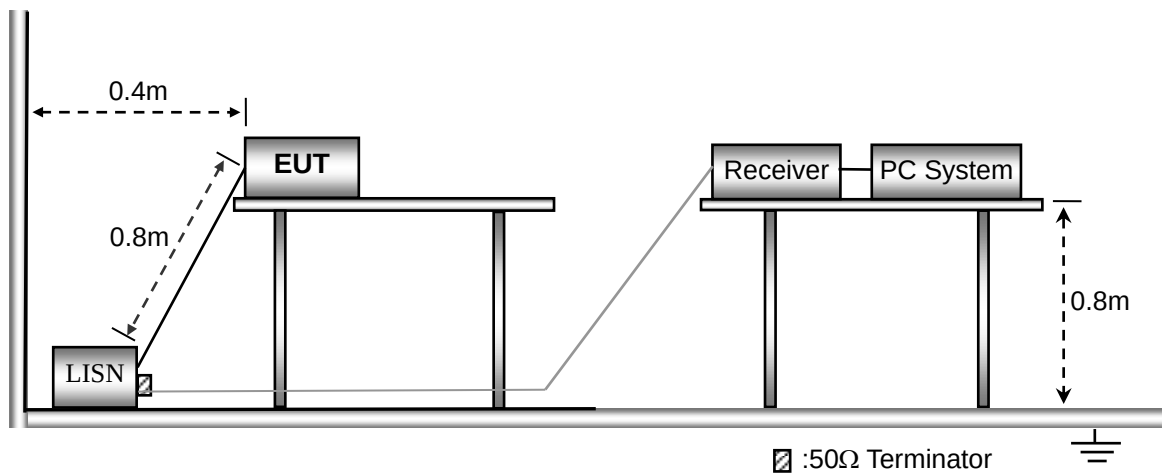
7.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

7.2 Basic Test Setup Block Diagram



7.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

7.4 Summary of Test Results/Plots

Not applicable

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

******* END OF REPORT *******