




RF TEST REPORT



Report No.: 17070289-FCC-R

Supersede Report No.: N/A

Applicant	EDMI(Shenzhen)Co.,Ltd	
Product Name	SER100	
Model No.	SER100	
Serial Model No.	N/A	
Test Standard	FCC 15.231:2016, ANSI C63.4:2014	
Test Date	May 11 to December 08, 2017	
Issue Date	December 12, 2017	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
		
Loren Luo Test Engineer	David Huang Checked By	
<p>This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only</p>		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

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1. Report Revision History

Report No.	Report Version	Description	Issue Date
17070289-FCC-R	NONE	Original	December 12, 2017


2. Customer information

Applicant Name	EDMI(Shenzhen)Co.,Ltd
Applicant Add	Floor 2&3, Building 2, Zhong Yuntai Science&Technology Industrial Park, Tang Tou 1st Road, Tang Tou Community, Shi Yan Street, Bao An District, Shen Zhen.
Manufacturer	EDMI(Shenzhen)Co.,Ltd
Manufacturer Add	Floor 2&3, Building 2, Zhong Yuntai Science&Technology Industrial Park, Tang Tou 1st Road, Tang Tou Community, Shi Yan Street, Bao An District, Shen Zhen.

3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

4. Equipment under Test (EUT) Information

Description of EUT:	SER100
Main Model:	SER100
Serial Model:	N/A
Date EUT received:	May 10, 2017
Test Date(s):	May 11 to December 08, 2017
RF Operating Frequency (ies):	433.3-434.5MHz(TX/RX)
Number of Channels :	1 CH
Equipment Category:	DSC
Antenna Gain:	1.5dBi
Antenna Gain:	External Patch PCB
Input Power:	Spec: 7.0-15V
Trade Name :	
FCC ID:	2AC6HSER100
Port:	RS232 Port, RS485 Port, Power Port
Type of Modulation:	FSK

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

Test Results Summary

Test Standard	Description	Pass / Fail
CFR 47 Part 15.231		
15.203	Antenna Requirement	Pass
15.207	Conducted Emissions Voltage	N/A
15.231(e)	Fundamental & Radiated Spurious Emission	Pass
15.231(c)	20dB Bandwidth	Pass
15.231(e)	Deactivation	Pass
ANSI C63.4: 2014		
PS: All measurement uncertainties are not taken into consideration for all presented test result.		

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 Antenna Requirement

Requirement(s): 47 CFR §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.

Antenna requirement must meet at least one of the following:

- a) Antenna must be permanently attached to the device.
- b) Antenna must use a unique type of connector to attach to the device.
- c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

Test result: Pass

The antenna is permanently attached to the device which meets the requirement.

6.2 Conducted Emissions Voltage

Temperature	24°C
Relative Humidity	62%
Atmospheric Pressure	1012mbar
Test date :	-----
Tested By :	Loren Luo

Requirement:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15– 0.5	66 to 56*	56 to 46*
0.5– 5	56	46
5– 30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

- All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ± 3.5 dB.

Test result: N/A (Batteries operated)

6.3 20dB Occupied Bandwidth

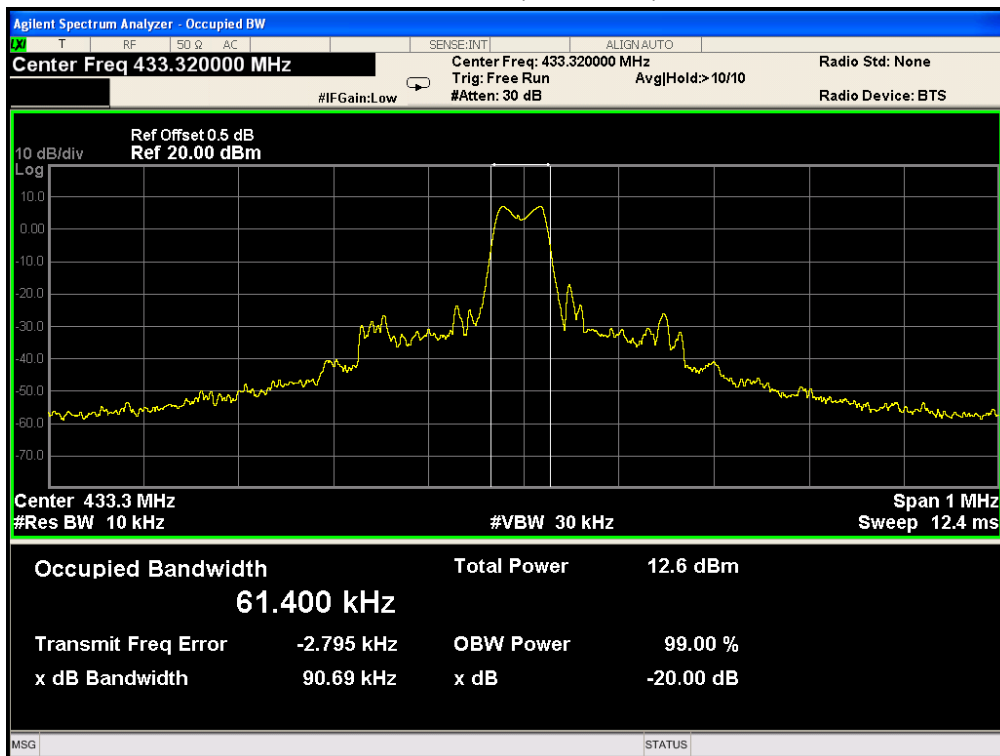
Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	December 08, 2017
Tested By :	Loren Luo

20dB bandwidth was measured by conducted method using a spectrum analyzer.

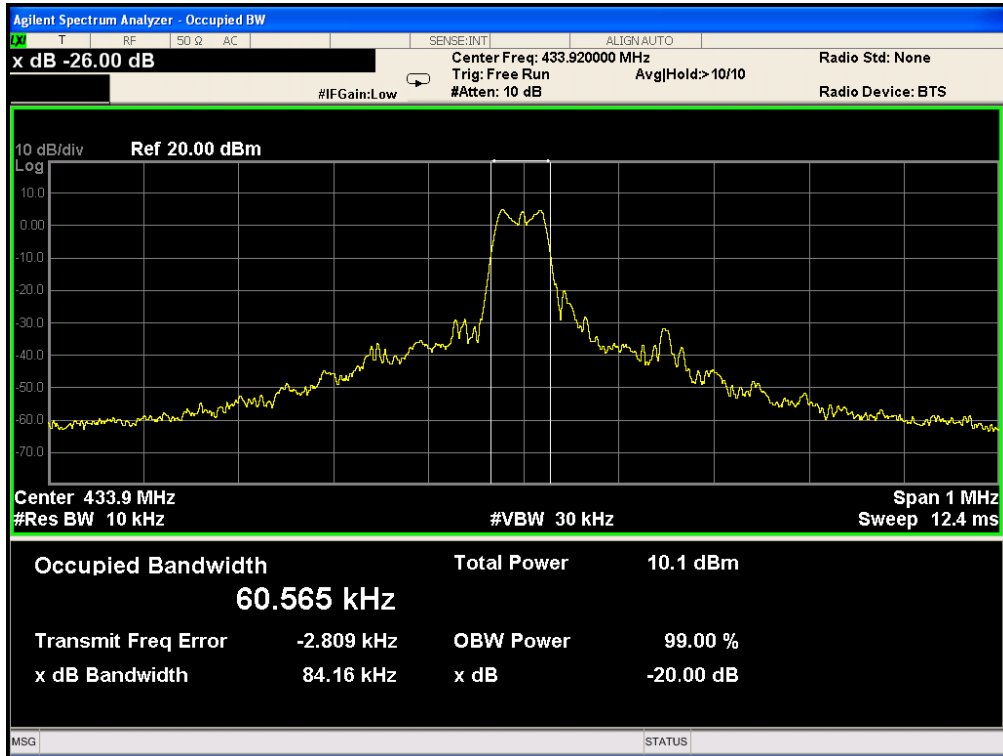
Test Result:

Fundamental Frequency (MHz)	Measured 20dB Bandwidth (kHz)	FCC 15.231 Limit (kHz)	Result
433.3	90.69	1084.80	Pass
433.9	84.16	1084.80	Pass
434.5	76.90	1084.80	Pass

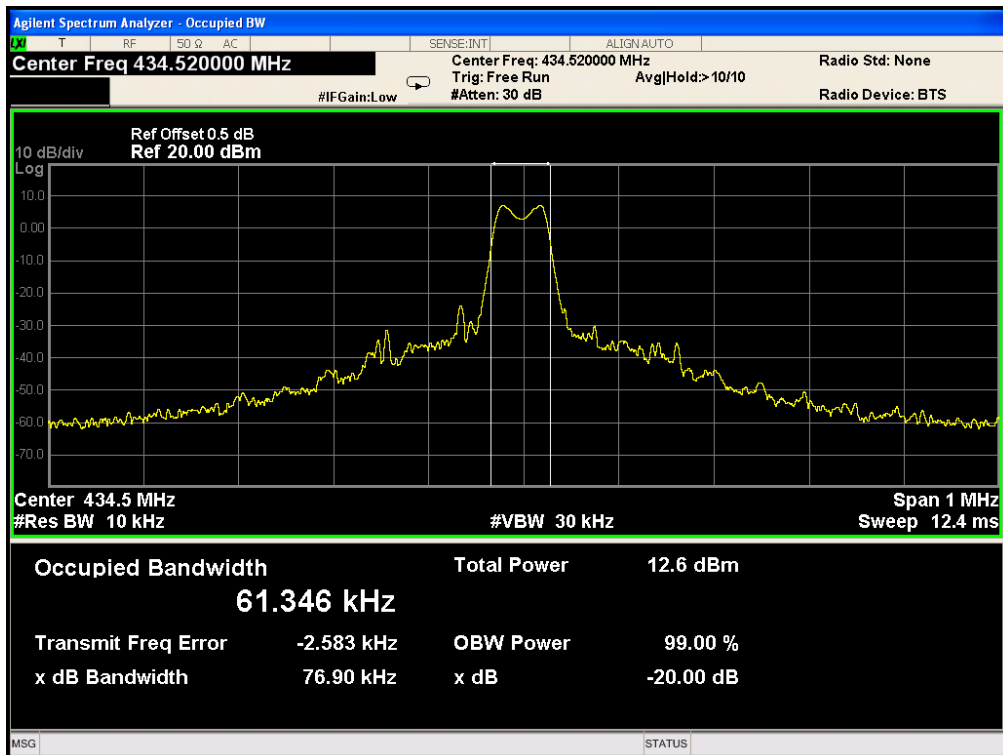
Low Channel (433.3 MHz)



Mid Channel (433.9 MHz)



High Channel (434.5 MHz)



6.4 Radiated Fundamental and Spurious Emission

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	December 08, 2017
Tested By :	Loren Luo

- Radiated emissions were measured according to ANSI C63.4. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1meter above the ground from the center of the loop. The measuring bandwidth was set to 10kHz. All possible modes of operation were investigated. Only the worst case emissions measured, All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- Sample Calculation: Corrected Amplitude=Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor.
Sample Calculation:
1) Corrected Amplitude= Raw Amplitude(dBuV/m)+ACF(dB)+Cable Loss(dB)-Distance Correction Factor
2) Average = peak reading + 20log(duty cycle)
- Radiated Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz(QP only3m & 10m) is +5.6/-4.5dB(for EUTs<0.5m×0.5m×0.5m).In range of 1-40GHz) is ±3.6dB.

Standard Requirement:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1,500	50 to 150
174-260	1,500	150
260-470	1,500-5,000	150-500
Above 470	5,000	500

Test Result: Pass

Low Channel (433.32 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
433.32	-29.37	H	90.35	60.98	92.85	72.85	-2.5	-11.87
866.64	-29.37	H	54.04	24.67	72.85	52.85	-18.81	-28.18
1299.96	-29.37	H	54.93	25.56	72.85	52.85	-17.92	-27.29
1733.28	-29.37	H	52.65	23.28	72.85	52.85	-20.2	-29.57
2166.6	-29.37	H	51.22	21.85	72.85	52.85	-21.63	-31
2599.92	-29.37	H	53.5	24.13	72.85	52.85	-19.35	-28.72
210.79	-29.37	H	54.84	25.47	74	54	-19.16	-28.53
3466.56	-29.37	H	53.7	24.33	72.85	52.85	-19.15	-28.52
63.98	-29.37	H	34.74	5.37	74	54	-39.26	-48.63
4333.2	-29.37	H	54.16	24.79	72.85	52.85	-18.69	-28.06
5199.84	-29.37	H	57.65	28.28	72.85	52.85	-15.2	-24.57
433.32	-29.37	V	88.7	59.33	92.85	72.85	-4.15	-13.52
866.64	-29.37	V	42.45	13.08	72.85	52.85	-30.4	-39.77
1299.96	-29.37	V	53.53	24.16	72.85	52.85	-19.32	-28.69
1733.28	-29.37	V	48.38	19.01	72.85	52.85	-24.47	-33.84
2166.6	-29.37	V	45.74	16.37	72.85	52.85	-27.11	-36.48
2599.92	-29.37	V	48.6	19.23	72.85	52.85	-24.25	-33.62
63.76	-29.37	V	40.9	11.53	74	54	-33.1	-42.47
3466.56	-29.37	V	49.72	20.35	72.85	52.85	-23.13	-32.5
210.79	-29.37	V	49.56	20.19	74	54	-24.44	-33.81
4333.2	-29.37	V	50.27	20.9	72.85	52.85	-22.58	-31.95
5199.84	-29.37	V	52.9	23.53	72.85	52.85	-19.95	-29.32

Middle Channel (433.92 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
433.92	-30.78	H	89.26	58.48	92.87	72.87	-3.61	-14.39
867.84	-30.78	H	42.75	11.97	72.87	52.87	-30.12	-40.9
1301.76	-30.78	H	52.69	21.91	72.87	52.87	-20.18	-30.96
1735.68	-30.78	H	48.24	17.46	72.87	52.87	-24.63	-35.41
2169.6	-30.78	H	45.75	14.97	72.87	52.87	-27.12	-37.9
2603.52	-30.78	H	47.99	17.21	72.87	52.87	-24.88	-35.66
157.56	-30.78	H	40.95	10.17	74	54	-33.05	-43.83
3471.36	-30.78	H	50.2	19.42	72.87	52.87	-22.67	-33.45
224.52	-30.78	H	48.67	17.89	74	54	-25.33	-36.11
4339.2	-30.78	H	50.36	19.58	72.87	52.87	-22.51	-33.29
4773.12	-30.78	H	52.46	21.68	72.87	52.87	-20.41	-31.19
5207.04	-30.78	H	52.74	21.96	72.87	52.87	-20.13	-30.91
433.92	-30.78	V	86.45	55.67	92.87	72.87	-6.42	-17.2
867.84	-30.78	V	42.34	11.56	72.87	52.87	-30.53	-41.31
1301.76	-30.78	V	53.69	22.91	72.87	52.87	-19.18	-29.96
1735.68	-30.78	V	48.15	17.37	72.87	52.87	-24.72	-35.5
2169.6	-30.78	V	46.13	15.35	72.87	52.87	-26.74	-37.52
2603.52	-30.78	V	49.21	18.43	72.87	52.87	-23.66	-34.44
157.56	-30.78	V	41.36	10.58	74	54	-32.64	-43.42
3471.36	-30.78	V	50.52	19.74	72.87	52.87	-22.35	-33.13
226.1	-30.78	V	48.87	18.09	74	54	-25.13	-35.91
4339.2	-30.78	V	50.72	19.94	72.87	52.87	-22.15	-32.93
5207.04	-30.78	V	52.53	21.75	72.87	52.87	-20.34	-31.12
5631.6	-30.78	V	53.24	22.46	72.87	52.87	-19.63	-30.41

High Channel (434.52 MHz)

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
434.52	-29.5	H	89.94	60.44	92.89	72.89	-2.95	-12.45
869.04	-29.5	H	47.49	17.99	72.89	52.89	-25.4	-34.9
1303.56	-29.5	H	67.83	38.33	72.89	52.89	-5.06	-14.56
1738.08	-29.5	H	55.13	25.63	72.89	52.89	-17.76	-27.26
2172.6	-29.5	H	43.56	14.06	72.89	52.89	-29.33	-38.83
2607.12	-29.5	H	54.17	24.67	72.89	52.89	-18.72	-28.22
3041.64	-29.5	H	50.98	21.48	72.89	52.89	-21.91	-31.41
3476.16	-29.5	H	48.22	18.72	72.89	52.89	-24.67	-34.17
3910.68	-29.5	H	54.6	25.1	72.89	52.89	-18.29	-27.79
4779.72	-29.5	H	53.68	24.18	72.89	52.89	-19.21	-28.71
202.81	-29.5	H	42.21	12.71	74	54	-31.79	-41.29
434.52	-29.5	V	86.35	56.85	92.89	72.89	-6.54	-16.04
869.04	-29.5	V	62.55	33.05	72.89	52.89	-10.34	-19.84
1303.56	-29.5	V	65.11	35.61	72.89	52.89	-7.78	-17.28
1738.08	-29.5	V	54.32	24.82	72.89	52.89	-18.57	-28.07
208.58	-29.5	V	44.56	15.06	74	54	-29.44	-38.94
2607.12	-29.5	V	48.39	18.89	72.89	52.89	-24.5	-34
3041.64	-29.5	V	48.64	19.14	72.89	52.89	-24.25	-33.75
3910.68	-29.5	V	49.93	20.43	72.89	52.89	-22.96	-32.46
4779.72	-29.5	V	50.92	21.42	72.89	52.89	-21.97	-31.47
155.36	-29.5	V	41.36	11.86	74	54	-32.64	-42.14
194.45	-29.5	V	42.58	13.08	74	54	-31.42	-40.92

Notes:

- Duty cycle: Low channel is 0.034%, $20\log(\text{duty cycle}) = -29.37\text{dB}$;
Middle channel is 0.0289%, $20\log(\text{duty cycle}) = -30.78\text{dB}$;
High channel is 0.0335%, $20\log(\text{duty cycle}) = -29.50\text{dB}$; correction was used to determine the average level from the peak
- Reading. Average = peak reading + $20\log(\text{duty cycle})$, Final Average=
Low Channel: peak reading -29.37
Middle Channel: peak reading -30.78
High Channel: peak reading -29.50

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3. All the data measurement of peak values.

FCC Limit for Average Measurement=

Low channel: $1,500+(5,000-1,500)/(470-260)*(433.32-260) \mu \text{ V/m} = 72.85\text{dB}\mu \text{ V/m}$

Middle channel: $1,500+(5,000-1,500)/(470-260)*(433.92-260) \mu \text{ V/m} = 72.87\text{dB}\mu \text{ V/m}$

High channel: $1,500+(5,000-1,500)/(470-260)*(434.52-260) \mu \text{ V/m} = 72.89\text{dB}\mu \text{ V/m}$

4. Average pulsed signal over one complete pulse train or 100 ms time frame if pulse train exceeds 100 ms

5. Maximum average in 100 ms

6. Calculate duty cycle for pulse train or 100 ms

7. Duty cycle = $(t_1 + t_2 + t_3 + \dots + t_n)/T$ where t_n = pulse width, T = pulse train length or 100 ms

8. Pulse width (PW) = 100ms

$2/PW = 2/100\text{ms} = 0.02 \text{ kHz}$

$RBW > 2/PW (0.02 \text{ kHz})$

Therefore PDCF is not needed.

Pulse Duty Cycle:

Duty cycle=

Low Channel: $3.4/100 = -0.034\%$

Middle Channel: $2.89/100 = -0.0289\%$

High Channel: $3.35/100 = -0.0335\%$

Average Duty Factor:

Low Channel : $20*\log (\text{Duty Cycle}) = -29.37\text{dB}$

Middle Channel : $20*\log (\text{Duty Cycle}) = -30.78\text{dB}$

High Channel : $20*\log (\text{Duty Cycle}) = -29.50\text{dB}$

6.5 Deactivation

Temperature	25°C
Relative Humidity	50%
Atmospheric Pressure	1008mbar
Test date :	December 08, 2017
Tested By :	Loren Luo

Deactivation was measured by conducted method using a spectrum analyzer.

Standard requirement: 47 CFR §15.231 (e)

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Result: Pass

Frequency (MHz)	The duration of transmission	Limit(The duration of transmission)	Verdict (Pass)
433.32	3.40(ms)	<=5s	Pass
433.92	2.89(ms)	<=5s	Pass
434.52	3.35 (ms)	<=5s	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted					
EMI test receiver	ESCS30	8471241027	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191106	09/23/2017	09/22/2018	<input checked="" type="checkbox"/>
Line Impedance	LI-125A	191107	09/23/2017	09/22/2018	<input checked="" type="checkbox"/>
ISN	ISN T800	34373	09/23/2017	09/22/2018	<input type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	<input checked="" type="checkbox"/>
Transient Limiter	LIT-153	531118	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
RF conducted test					
Agilent ESA-E SERIES	E4407B	MY45108319	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Radiated Emissions					
EMI test receiver	ESL6	100262	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Positioning Controller	UC3000	MF780208282	11/18/2016	11/17/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/19/2017	09/18/2018	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/23/2017	09/22/2018	<input checked="" type="checkbox"/>

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

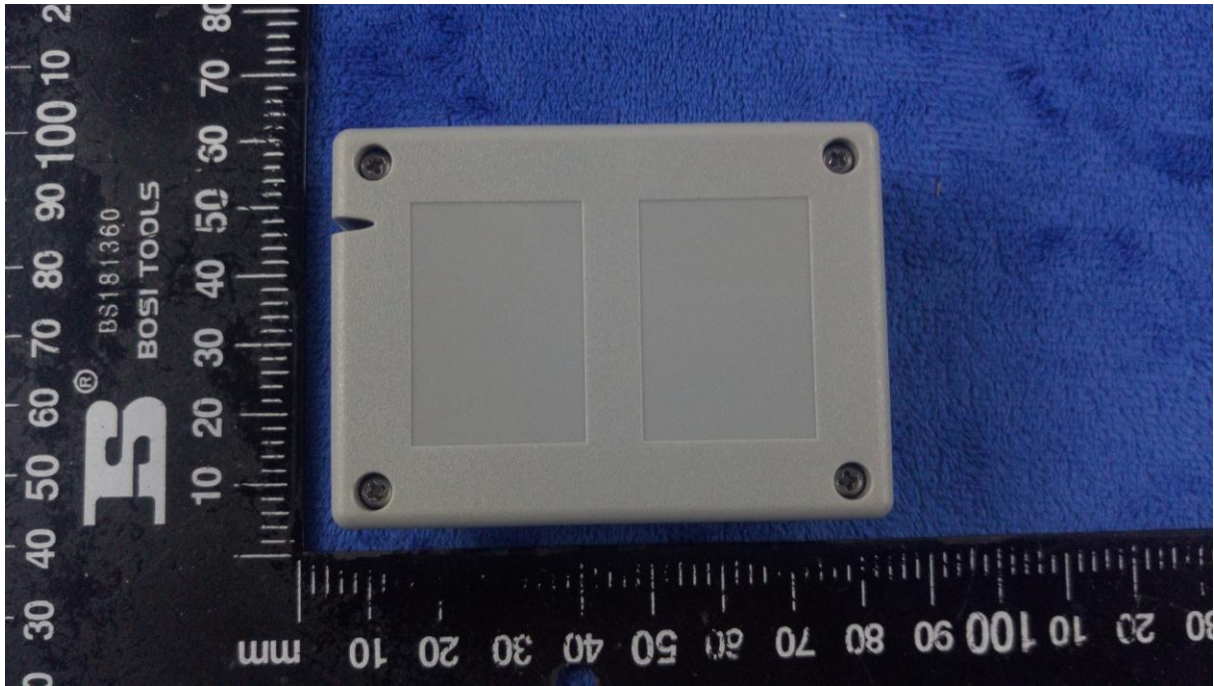
Whole Package View



EUT - Front View



EUT - Rear View



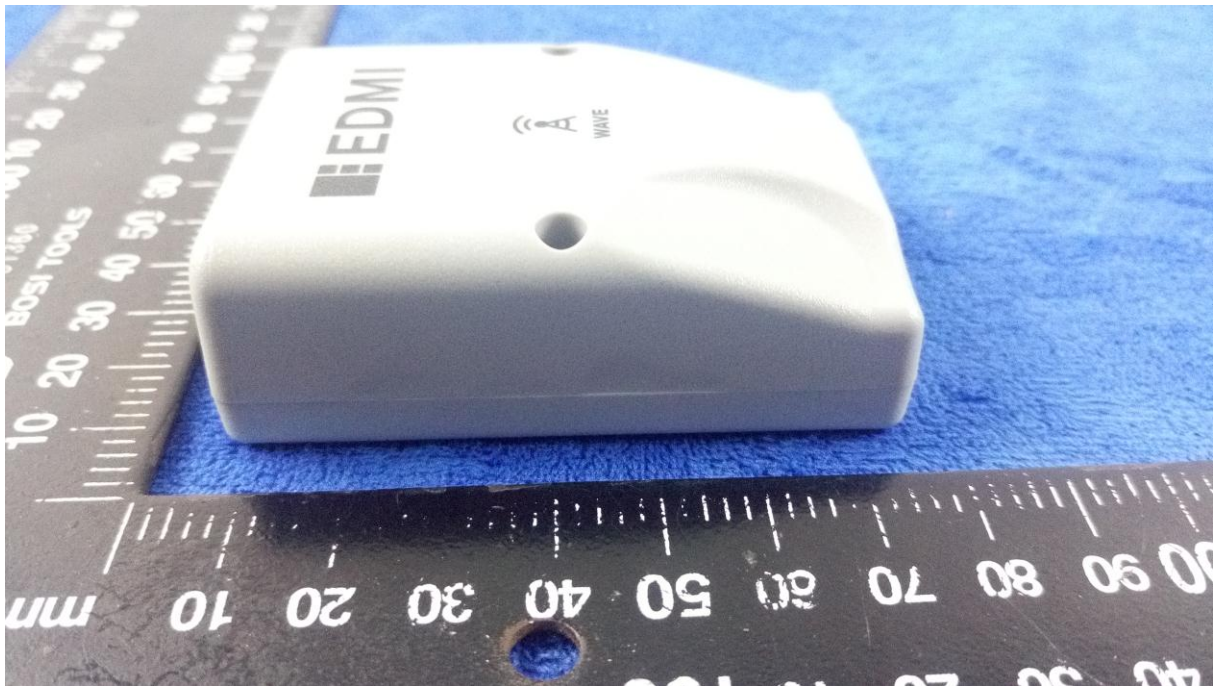
EUT - Top View



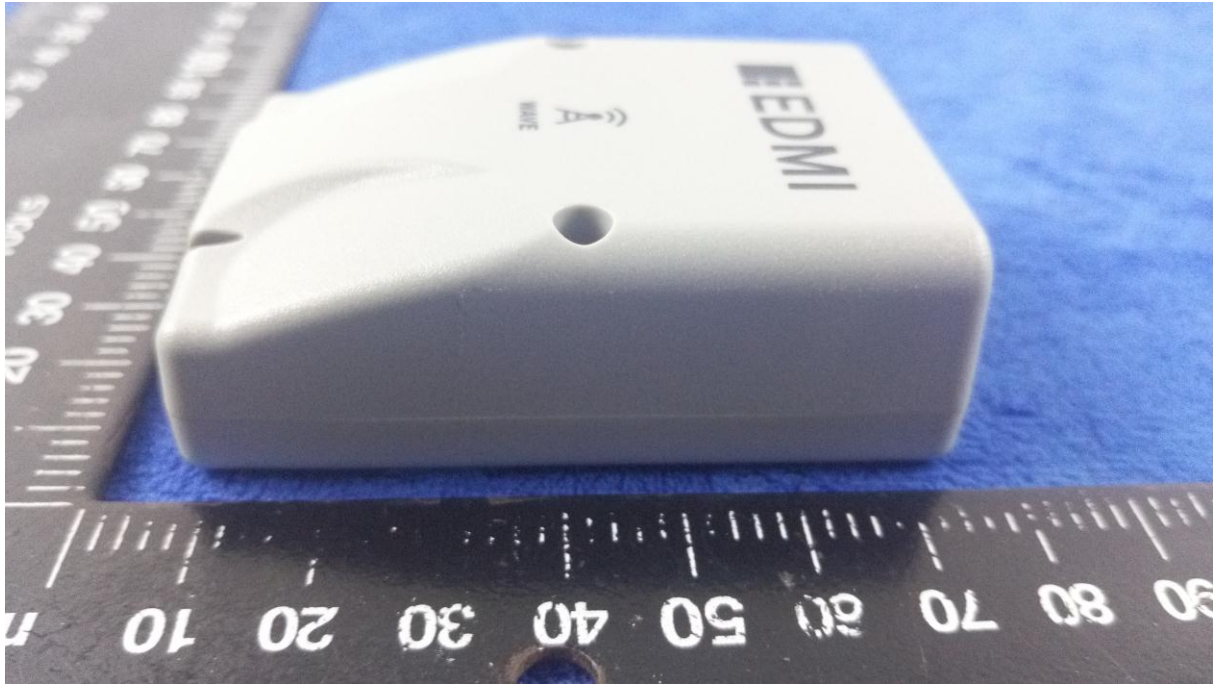
EUT - Bottom View



EUT - Left View

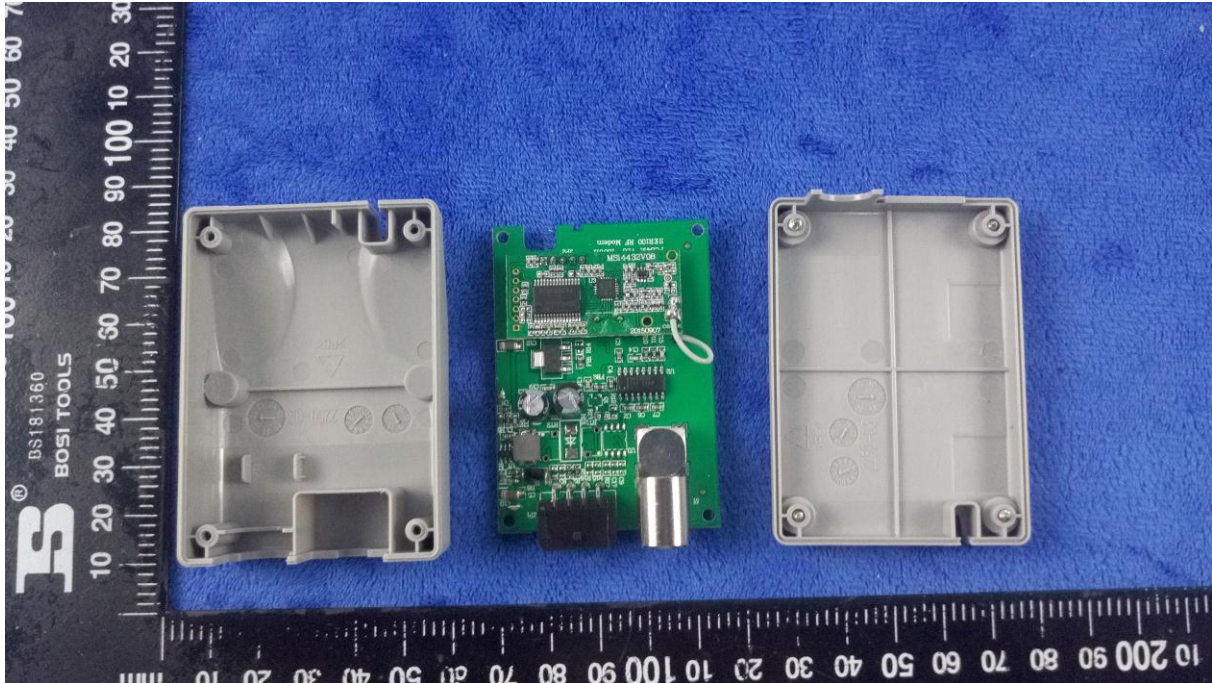


EUT - Right View

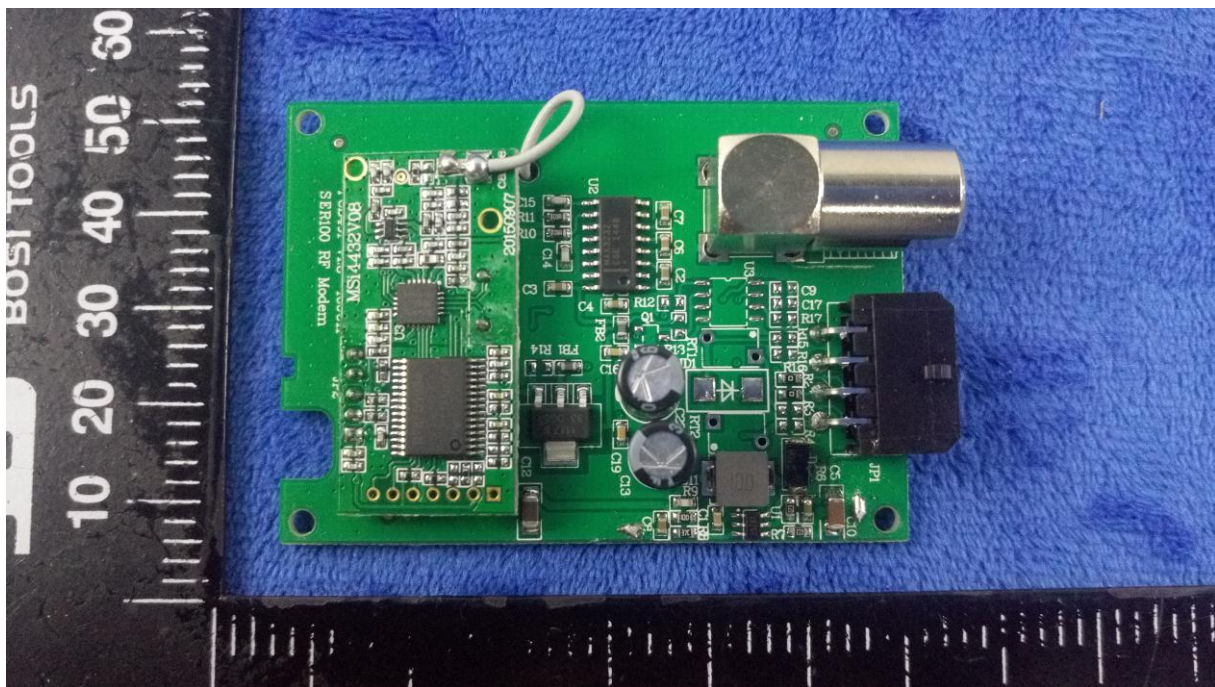


Annex B.ii. Photograph: EUT Internal Photo

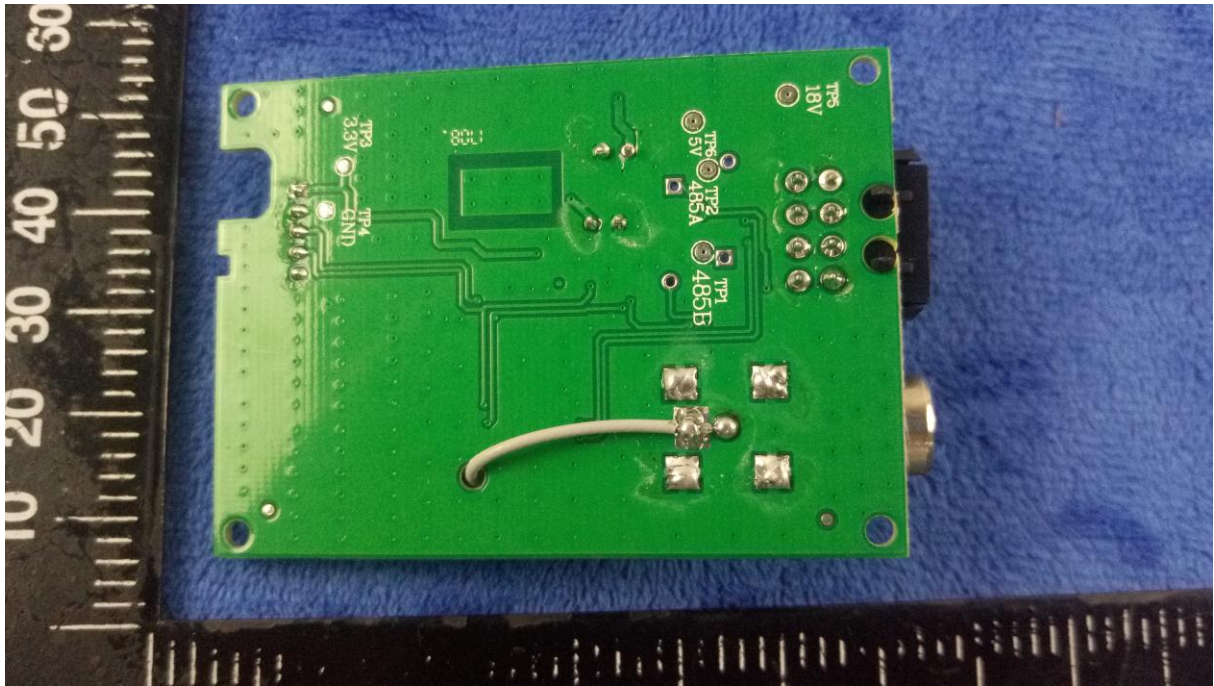
Cover Off - Top View



Mainboard - Front View



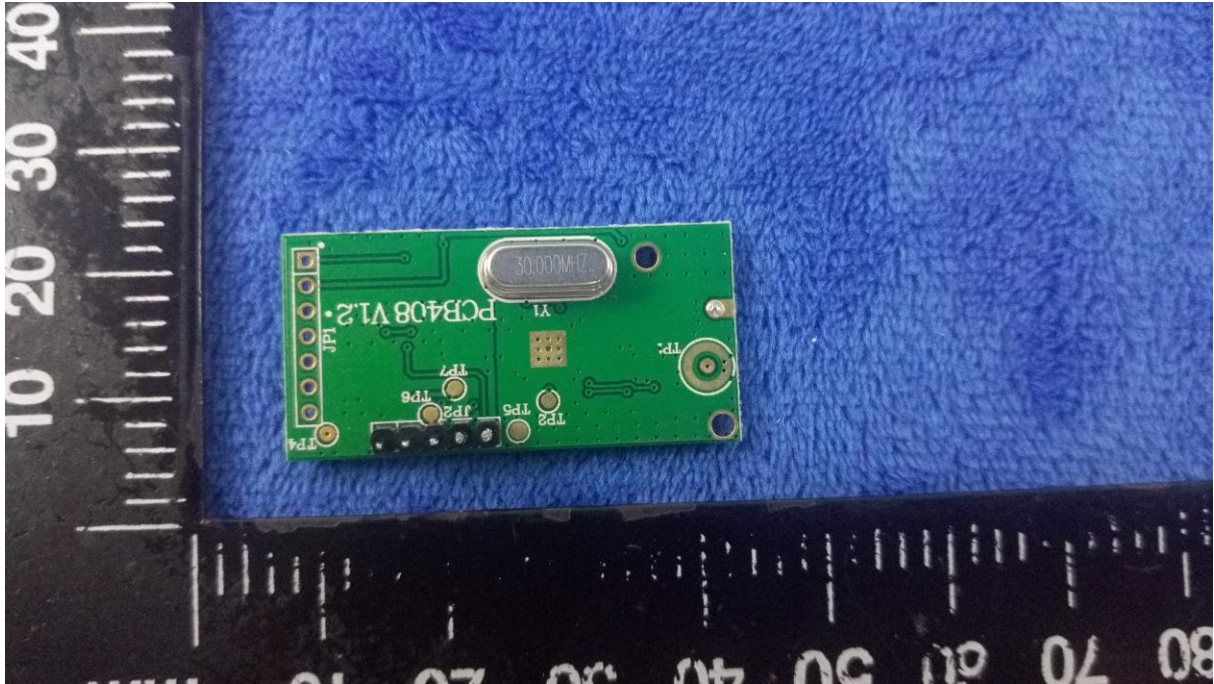
Mainboard – Rear View



Smallboard - Front View



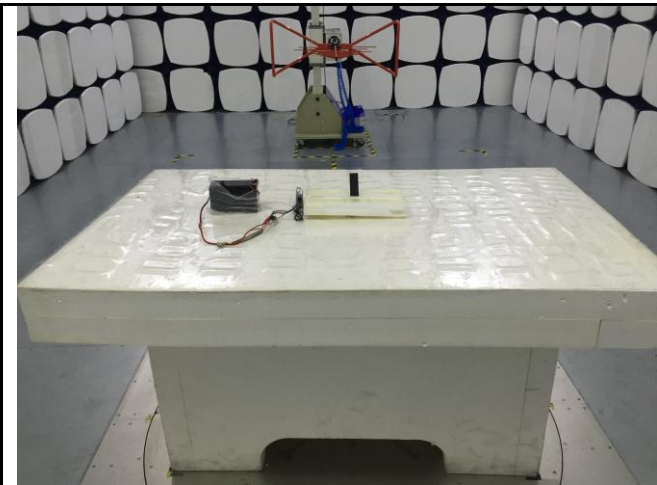
Smallboard – Rear View



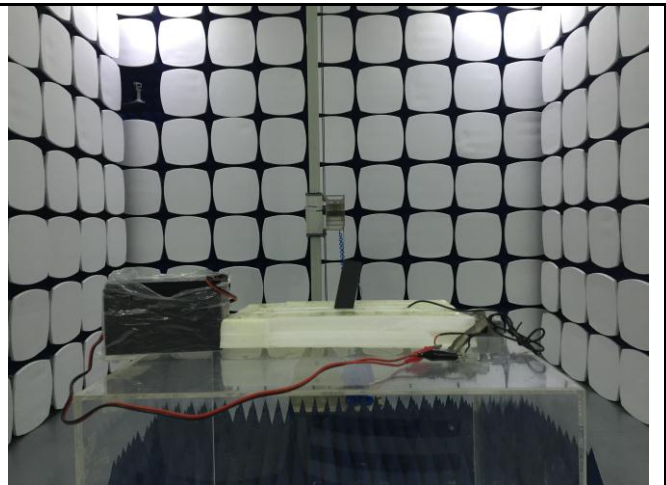
Antenna View



Annex B.iii. Photograph: Test Setup Photo



Radiated Spurious Emissions Test Setup Below 1GHz

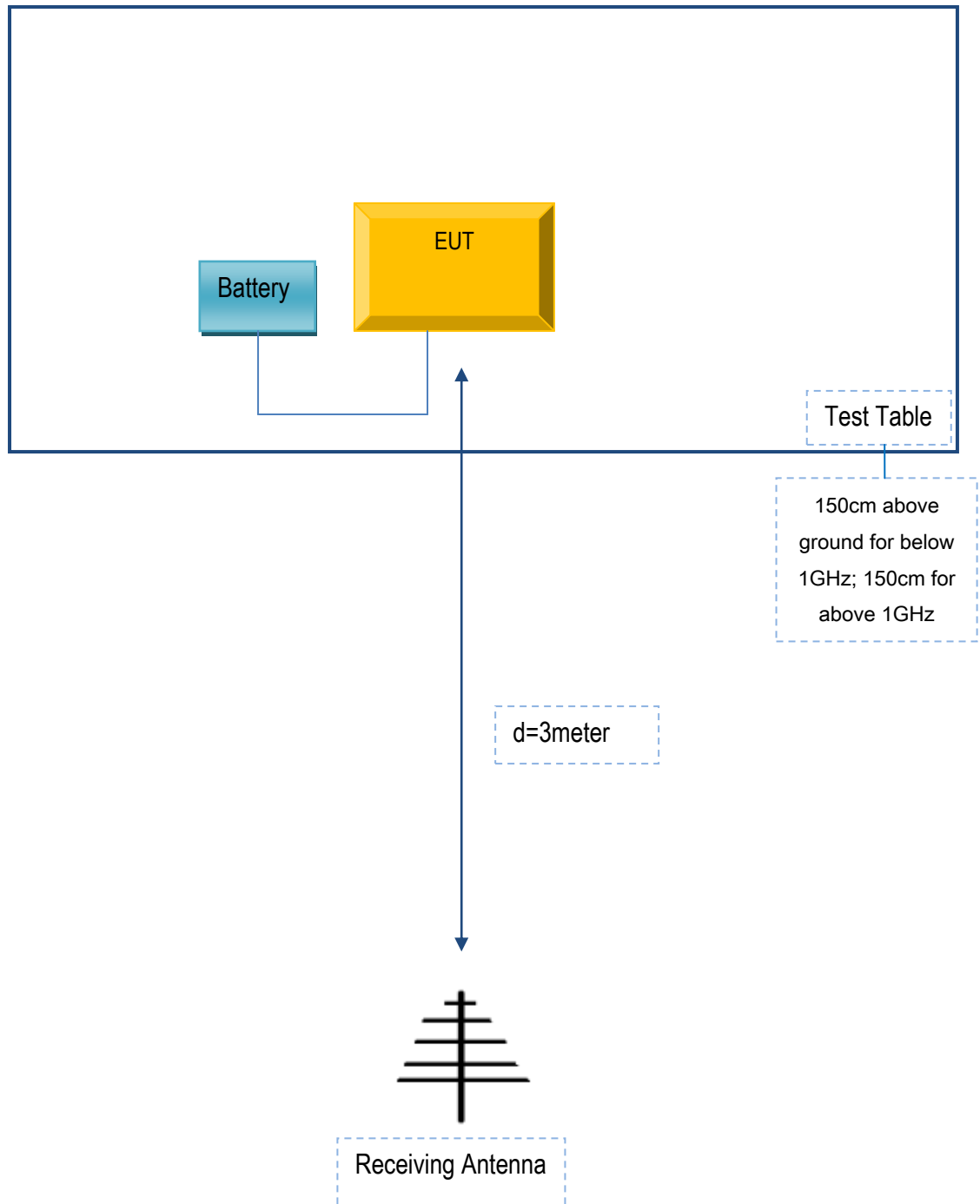


Radiated Spurious Emissions Test Setup Above
1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Panasonic	Battery	UP-RW1228ST4	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
Power Cables	Un-shielding	No	0.8m	N/A

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Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

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Annex E. DECLARATION OF SIMILARITY

N/A