

FCC TEST REPORT

for
Supervision Two Inc.

Data Transmitter
Model No.: LOT161030

Prepared for : Supervision Two Inc.
Address : 369 Washington Avenue, Garden City Park, New York, 11040,
United States

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : R011610920I
Date of Test : Nov. 01~21, 2016
Date of Report : Nov. 22, 2016

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TEST REPORT

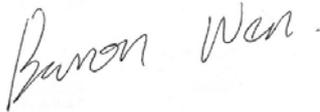
Applicant : Supervision Two Inc.
Manufacturer : Supervision Two Inc.
EUT : Data Transmitter
Model No. : LOT161030
Serial No. : N.A.
Trade Mark : N.A.
Rating : Input DC 5V, 500mA

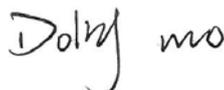
Measurement Procedure Used:
FCC Part15 Subpart C 2015, Paragraph 15.231

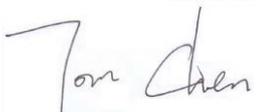
The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited

Date of Test : Nov. 01~21, 2016

Prepared by : 
(Tested Engineer / Baron Wen)

Reviewer : 
(Project Manager / Amy Ding)

Approved & Authorized Signer : 
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Data Transmitter

Model Number : LOT161030

Test Power Supply : DC 5V from the host

Frequency : 470MHz

Channel Numbers : 1

Modulation Type : FSK

Antenna Type : Spring Antenna

Antenna Gain : 3.0dBi

Applicant : Supervision Two Inc.
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United States

Manufacturer : Supervision Two Inc.
Address : 369 Washington Avenue, Garden City Park, New York, 11040,
United States

Factory : Supervision Two Inc.
Address : 369 Washington Avenue, Garden City Park, New York, 11040,
United States

Date of receiver : Nov. 01, 2016

Date of Test : Nov. 01~21, 2016

1.2. Description of Test Support Units

Notebook	: Manufacturer: TOSHIBA Model: PSJ11N-0GK001 CE, FCC DOC, VCCI
Printer	: Manufacturer: Brother M/N: MFC-3360C S/N: N/A CE, FCC:DOC

1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 06, 2016.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, Jun. 13, 2016.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited.
1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen,
Guangdong, China

1.4. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal) Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.5. Test Summary

Standard Section	Test Item	Test Method	Result
15.203	Antenna Requirement	ANSI C63.10 2013	PASS
15.207	Conducted Emission	ANSI C63.10 2013	PASS
15.231(b) 15.209	Radiated Emission	ANSI C63.10 2013	PASS
15.231(c)	20dB Occupied Bandwidth	ANSI C63.10 2013	PASS
15.231(a)	Dwell time	ANSI C63.10 2013	PASS

2. MEASURING DEVICE AND TEST EQUIPMENT

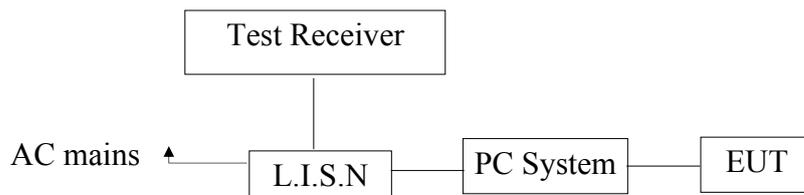
The following test equipments were used during test:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 16, 2016	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 16, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 16, 2016	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 16, 2016	1 Year
5	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 16, 2016	1 Year
6.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 16, 2016	1 Year
7	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 19, 2016	1 Year
8	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 19, 2016	1 Year
9	Pre-amplifier	SONOMA	310N	186860	Apr. 16, 2016	1 Year
10.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
8	Power Sensor	DAER	RPR3006W	15100041SN046	Jun 30, 2016	1 Year
11	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun 30, 2016	1 Year
12	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun 30, 2016	1 Year
13	Signal Generator	Agilent	E4421B	MY41000743	Jun 30, 2016	1 Year
14	DC Power supply	IV	IV-8080	YQSB0096	Jun 30, 2016	1 Year
15	TEMP&HUMI PROGRAMMABLE CHAMBER	Bell Group	BE-THK-150M8	SE-0137	Mar. 16, 2016	1 Year

3. CONDUCTED EMISSION

3.1. Block Diagram of Test Setup

Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

Setup the EUT and simulator as shown as Section 3.1.

Turn on the power of all equipment.

Let the EUT work in test mode (Transmitter) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.
The frequency range from 150kHz to 30MHz is checked.

3.6. Power Line Conducted Emission Measurement Results

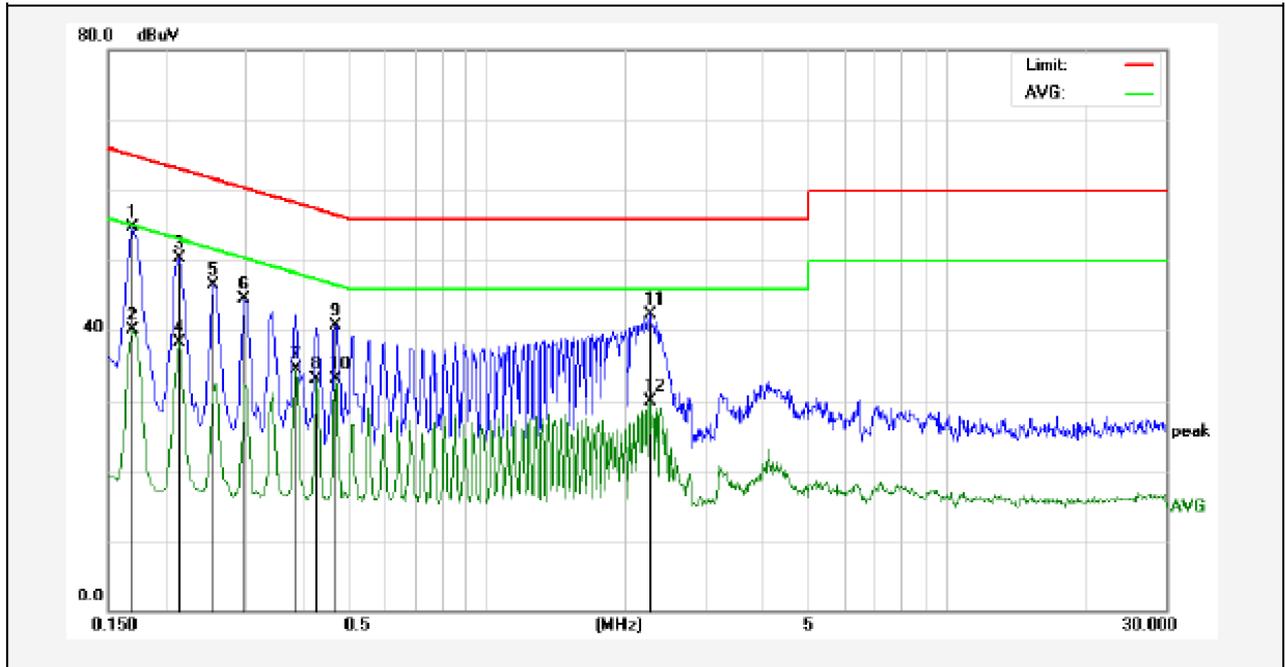
PASS.

The frequency range from 150kHz to 30 MHz is investigated.

Please refer the following pages.

CONDUCTED EMISSION TEST DATA

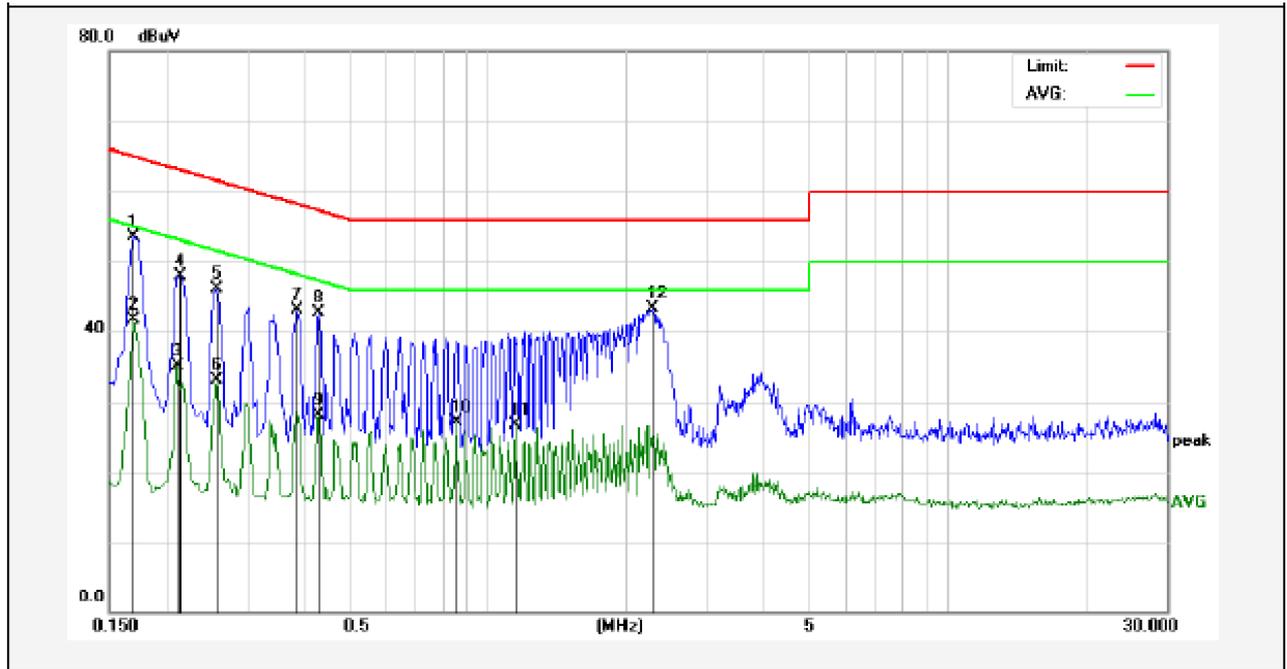
Test Site: 1# Shielded Room
 Operating Condition: Transmitter mode
 Test Specification: AC 120V/ 60Hz (Notebook adapter)
 Comment: Live Line
 Tem.:25°C Hum.:52%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1700	34.78	20.00	54.78	64.96	-10.18	QP	
2	0.1700	20.19	20.00	40.19	54.96	-14.77	AVG	
3	0.2140	30.34	20.00	50.34	63.04	-12.70	QP	
4	0.2140	18.34	20.00	38.34	53.04	-14.70	AVG	
5	0.2540	26.59	20.00	46.59	61.62	-15.03	QP	
6	0.2980	24.46	20.00	44.46	60.30	-15.84	QP	
7	0.3860	14.60	20.00	34.60	48.15	-13.55	AVG	
8	0.4260	13.15	20.00	33.15	47.33	-14.18	AVG	
9	0.4700	20.76	20.00	40.76	56.51	-15.75	QP	
10	0.4700	13.19	20.00	33.19	46.51	-13.32	AVG	
11	2.2620	22.24	20.00	42.24	56.00	-13.76	QP	
12	2.2620	9.94	20.00	29.94	46.00	-16.06	AVG	

CONDUCTED EMISSION TEST DATA

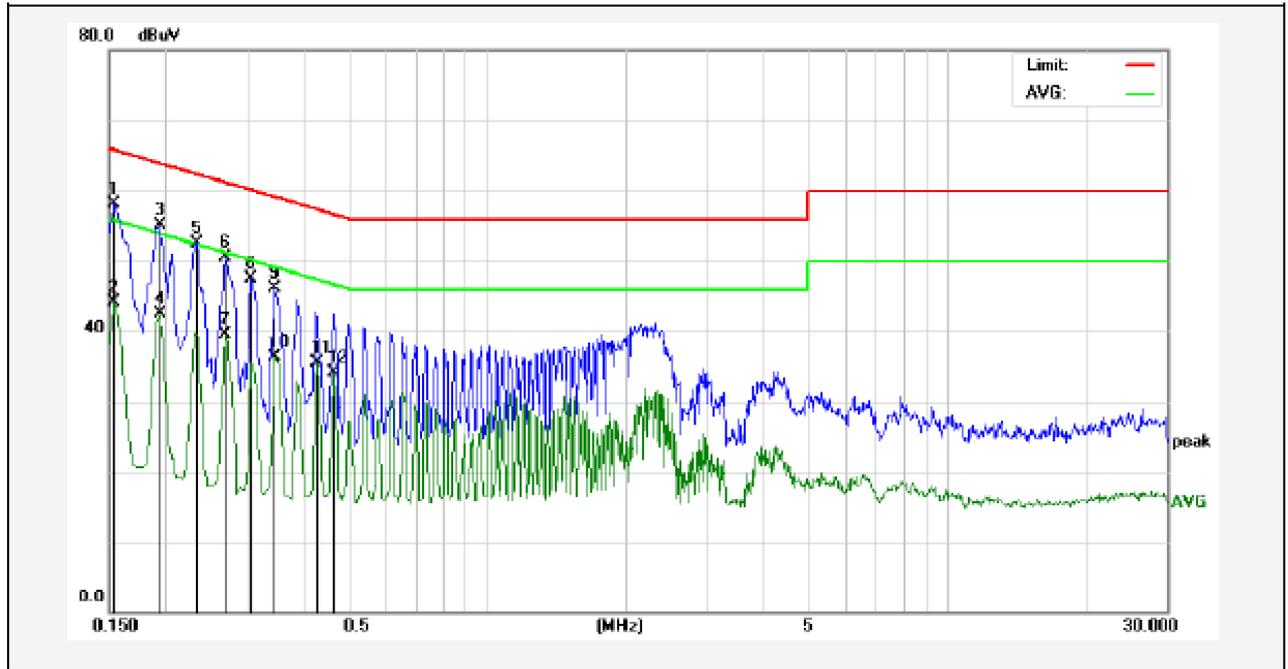
Test Site: 1# Shielded Room
 Operating Condition: Transmitter mode
 Test Specification: AC 120V/ 60Hz (Notebook adapter)
 Comment: Neutral Line
 Tem.:25°C Hum.:52%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1700	33.57	20.00	53.57	64.96	-11.39	QP	
2	0.1700	21.70	20.00	41.70	54.96	-13.26	AVG	
3	0.2100	15.17	20.00	35.17	53.20	-18.03	AVG	
4	0.2140	27.88	20.00	47.88	63.04	-15.16	QP	
5	0.2580	26.08	20.00	46.08	61.49	-15.41	QP	
6	0.2580	13.05	20.00	33.05	51.49	-18.44	AVG	
7	0.3860	23.18	20.00	43.18	58.15	-14.97	QP	
8	0.4300	22.71	20.00	42.71	57.25	-14.54	QP	
9	0.4300	8.15	20.00	28.15	47.25	-19.10	AVG	
10	0.8540	7.05	20.00	27.05	46.00	-18.95	AVG	
11	1.1500	6.76	20.00	26.76	46.00	-19.24	AVG	
12	2.2940	23.22	20.00	43.22	56.00	-12.78	QP	

CONDUCTED EMISSION TEST DATA

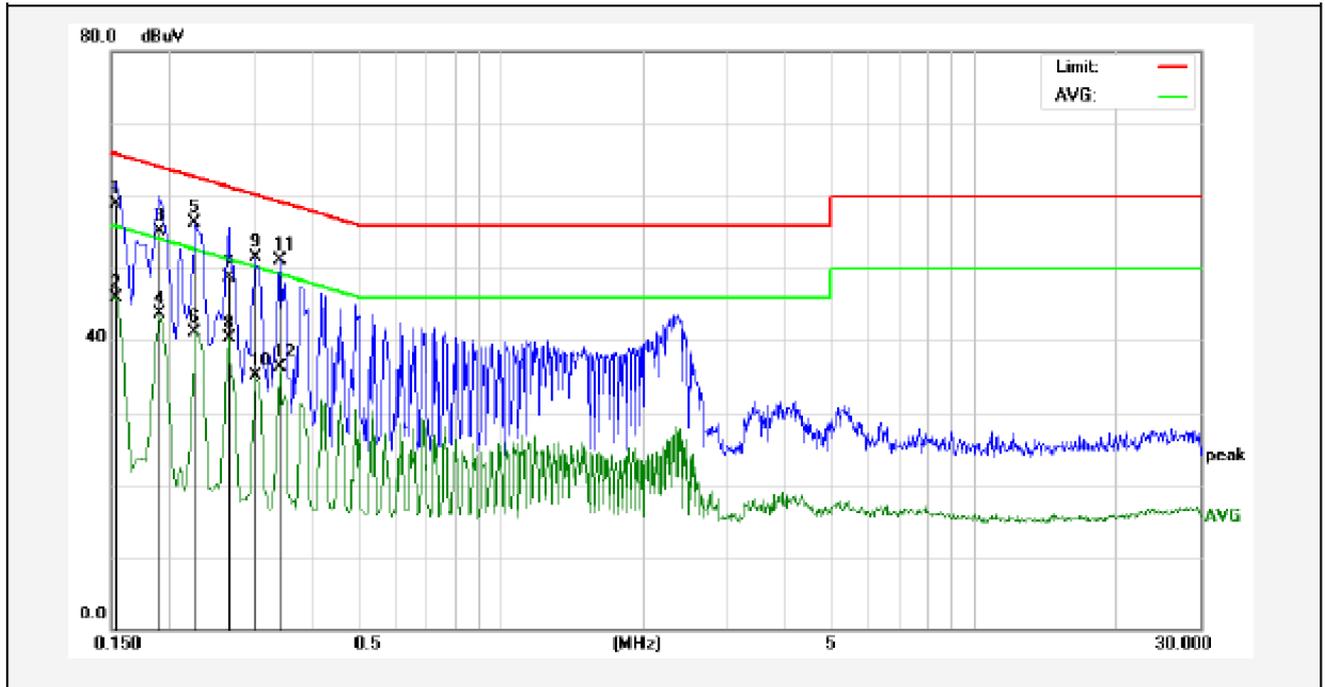
Test Site: 1# Shielded Room
 Operating Condition: Transmitter mode
 Test Specification: AC 240V/60Hz (Notebook adapter)
 Comment: Live Line
 Tem.:25°C Hum.:52%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1539	38.20	20.00	58.20	65.78	-7.58	QP	
2	0.1539	24.07	20.00	44.07	55.78	-11.71	AVG	
3	0.1940	35.14	20.00	55.14	63.86	-8.72	QP	
4	0.1940	22.43	20.00	42.43	53.86	-11.43	AVG	
5	0.2340	32.60	20.00	52.60	62.30	-9.70	QP	
6	0.2700	30.60	20.00	50.60	61.12	-10.52	QP	
7	0.2700	19.58	20.00	39.58	51.12	-11.54	AVG	
8	0.3060	27.56	20.00	47.56	60.08	-12.52	QP	
9	0.3460	26.13	20.00	46.13	59.06	-12.93	QP	
10	0.3460	16.37	20.00	36.37	49.06	-12.69	AVG	
11	0.4260	15.50	20.00	35.50	47.33	-11.83	AVG	
12	0.4620	14.15	20.00	34.15	46.66	-12.51	AVG	

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
 Operating Condition: Transmitter mode
 Test Specification: AC 240V/60Hz (Notebook adapter)
 Comment: Neutral Line
 Tem.:25°C Hum.:52%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1539	38.98	20.00	58.98	65.78	-6.80	QP	
2	0.1539	25.87	20.00	45.87	55.78	-9.91	AVG	
3	0.1900	35.07	20.00	55.07	64.03	-8.96	QP	
4	0.1900	23.65	20.00	43.65	54.03	-10.38	AVG	
5	0.2260	36.28	20.00	56.28	62.59	-6.31	QP	
6	0.2260	21.15	20.00	41.15	52.59	-11.44	AVG	
7	0.2660	28.72	20.00	48.72	61.24	-12.52	QP	
8	0.2660	20.21	20.00	40.21	51.24	-11.03	AVG	
9	0.3020	31.44	20.00	51.44	60.19	-8.75	QP	
10	0.3020	15.03	20.00	35.03	50.19	-15.16	AVG	
11	0.3420	31.20	20.00	51.20	59.15	-7.95	QP	
12	0.3420	16.22	20.00	36.22	49.15	-12.93	AVG	

4. RADIATED EMISSION

4.1. Requirements

According to 15.231(b) and 15.209, the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations
the formulas for calculating the maximum permitted fundamental field strengths are as follows:
for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level

$$\text{Emission Level (dBuV/m)} = 20 \log \text{Emission Level}(\mu\text{V/m})$$

According to 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

The field strength of emission limits have been calculated in below table:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)@3m
470	81.94 (AVG)
470	101.94 (Peak)

In addition field strength of any emissions which appear inside of the restriction band shall not exceed the general radiated emissions limits in Section 15.209(a).

Fundamental Frequency (MHz)	Field Strength (microvolts/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

4.2. Test Setup

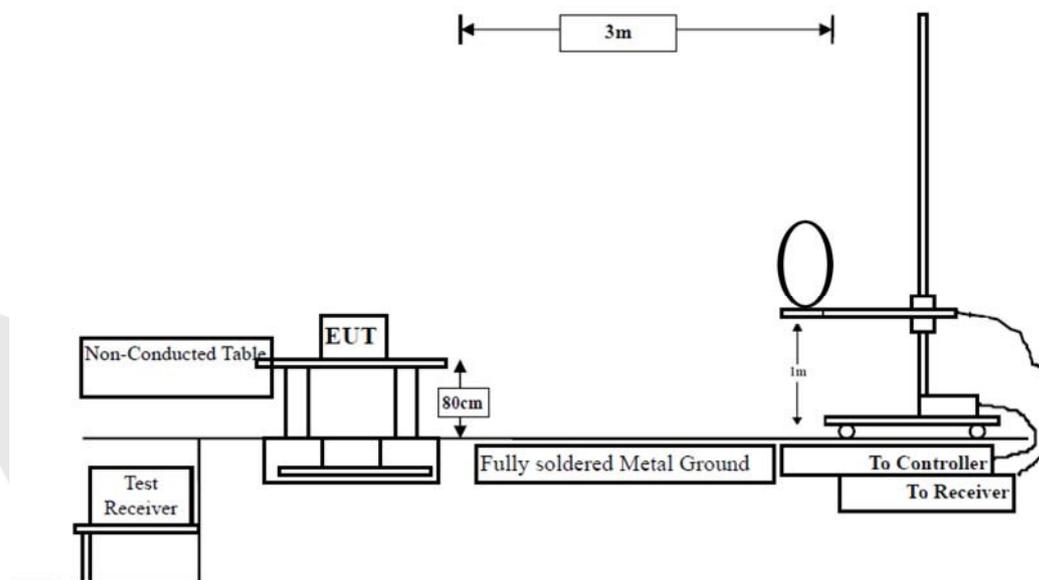


Figure 1. Below 30MHz

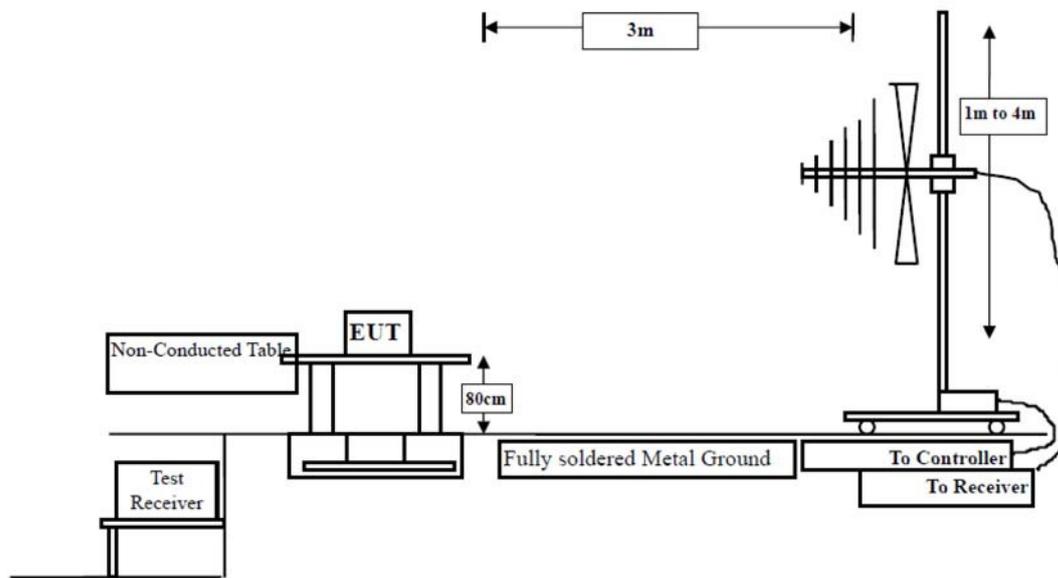


Figure 2. 30MHz to 1GHz

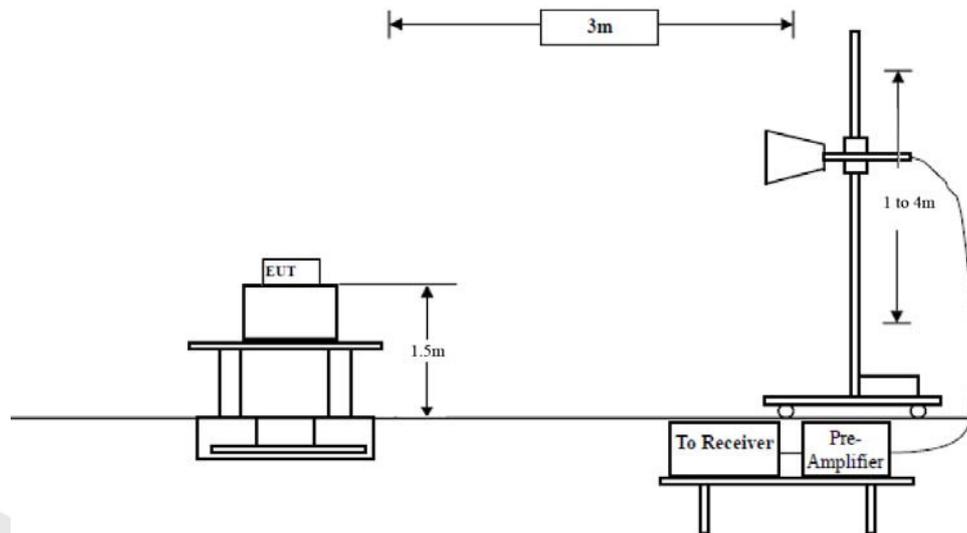


Figure 3. Above 1 GHz

4.3. Test Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

4.4. Test Results

PASS.

The test data please refer the following pages. Only the worst case (X orientation).

Data: Fundamental

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det.
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
470	H	94.73	1.54	12.48	40.05	--	68.70	101.94	PK
470	H	94.73	1.54	12.48	40.05	-2.05	66.65	81.94	AV
470	V	94.80	1.54	12.48	40.05	--	68.77	101.94	PK
470	V	94.80	1.54	12.48	40.05	-2.05	66.72	81.94	AV

Remark :

1. Result = Reading + Cable Loss +Ant Factor –Amplifier +Correction Factor

Calculate Formula:

AV=PEAK +Duty Cycle Factor

Duty Cycle Factor=20log(Duty Cycle)

Duty Cycle= on time/100 milliseconds or period, whichever is less

Test Data:

T on time=1.333*1+11.33*6+9.667*1=78.98 ms

T period=100.00ms (Actual T period>100ms)

Duty Cycle=78.98%

Duty Cycle Factor =20log(Duty Cycle)=-2.050

T on time slot-1



T on time slot-2



T on time slot-3



T period



Data: Radiated Emission

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Margin	Det.
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode
112.36	H	62.34	1.02	11.10	41.57	32.89	43.50	-10.61	PK
258.50	H	63.71	1.45	12.63	40.26	37.53	46.00	-8.47	PK
678.20	H	59.34	1.62	13.68	38.69	35.95	46.00	-10.05	PK
127.25	V	60.57	1.20	11.98	40.23	33.52	43.50	-9.98	PK
241.33	V	65.57	1.35	12.34	41.12	38.14	46.00	-7.86	PK
688.20	V	60.24	1.67	14.21	38.01	38.11	46.00	-7.89	PK

Remark :

1. Result = Reading + Cable Loss +Ant Factor –Amplifier +Correction Factor

Data: Harmonics Emissions

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Duty cycle Factor	Results	Limits	Det
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
940	H	74.25	1.52	12.53	41.42	--	46.88	81.94	PK
940	H	74.25	1.52	12.53	41.42	-2.05	44.83	61.94	AV
940	V	72.15	1.52	12.53	41.42	--	44.78	81.94	PK
940	V	72.15	1.52	12.53	41.42	-2.05	42.73	61.94	AV
1410	H	68.23	2.38	18.56	39.95	--	49.22	74	PK
1410	H	68.23	2.38	18.56	39.95	-2.05	47.17	54	AV
1410	V	65.11	2.38	18.56	39.95	--	46.10	74	PK
1410	V	65.11	2.38	18.56	39.95	-2.05	44.05	54	AV
1880	H	--	--	--	--	--	--	74	PK
1880	H	--	--	--	--	--	--	54	AV
1880	V	--	--	--	--	--	--	74	PK
1880	V	--	--	--	--	--	--	54	AV

Remark :

1. Result = Reading + Cable Loss +Ant Factor –Amplifier +Correction Factor
2. “ -- ” Mark indicated Background Noise Level

5. DWELL TIME

5.1. Test Requirements:

According to FCC Part 15.231(a)(1), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.2. Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer.

Set Spectrum Analyzer Center Frequency= Fundamental Frequency, RBW=100kHz, VBW=100 kHz, Span= 0Hz, Sweep Time= 5 Seconds.

The EUT was Programmed to be in continuously transmitting mode

Set Spectrum Analyzer View, Delta mark time.

5.3. Test Condition

Temperature	:	25 °C
Relative Humidity	:	65 %
Pressure	:	1010 hPa
Test Power	:	DC 5V

5.4. Test Results

Pass.

Transmitting time(s)	Limit(s)	Result
0.1833	≤5	PASS

Please refer the following plot.



6. 20DB BANDWIDTH

6.1. Test Requirements

According to FCC Part 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

So the emission bandwidth limits have been calculated in below table:

Fundamental Frequency	Limit of 20dB Bandwidth
470MHz	$470000 \times 0.0025 = 1175$ kHz

6.2. Test Procedure

With the EUT's antenna attached, the waveform was received by the test antenna which was connected to the spectrum analyzer.

Set Spectrum Analyzer Center Frequency= Fundamental Frequency, RBW=30kHz, VBW= 100 kHz, Span= 2MHz.

The EUT was Programmed to be in continuously transmitting mode.

Measured the spectrum width with power higher than 20 dB below carrier

6.3. Test Condition

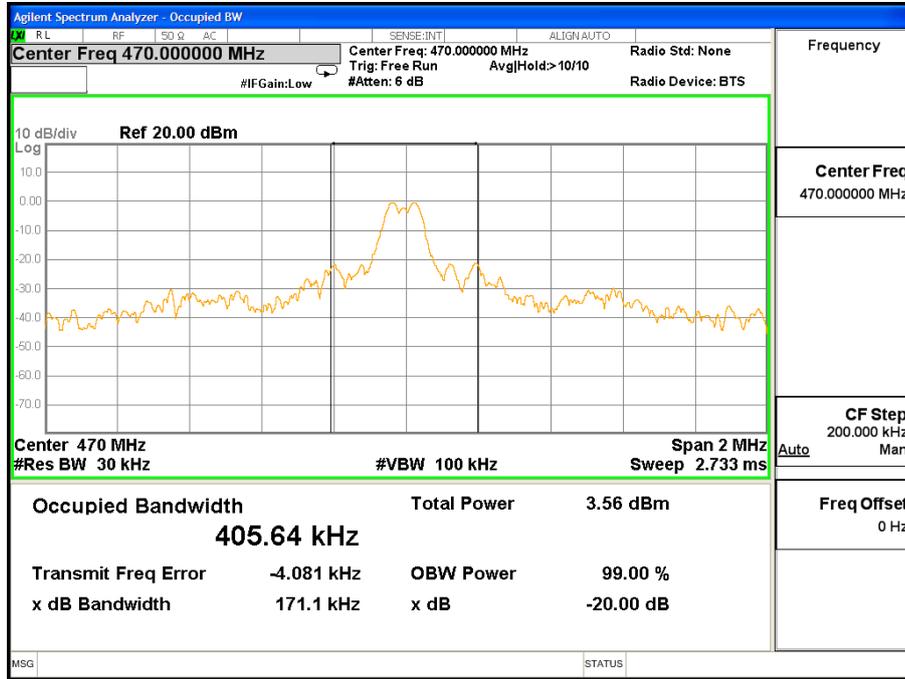
Temperature	25 °C
Relative Humidity	65 %
Pressure	1010 hPa
Test Power	DC 5V

6.4. Test Results

Pass.

Channel Frequency (MHz)	Measured 20dB Bandwidth(kHz)	Limit(kHz)	Result
470	171.1	<1175	PASS

Please refer the following plot.



7. ANTENNA REQUIREMENT

7.1. Antenna Requirement

The EUT'S antenna should meet the requirement of FCC part 15C section 15.203.

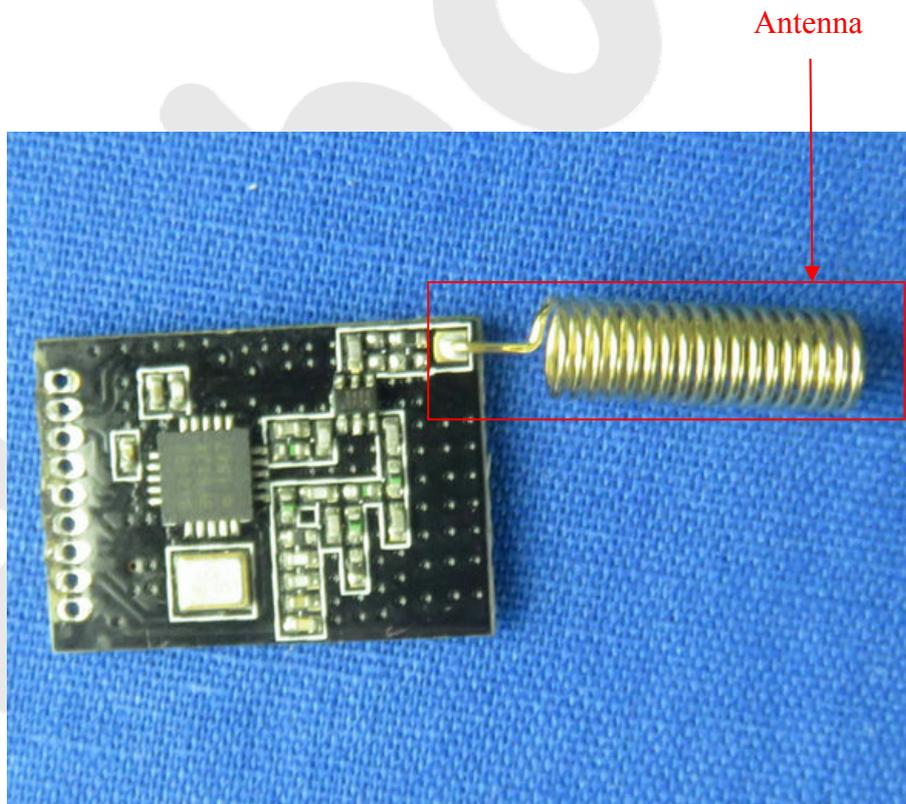
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

- 1) Antenna must be permanently attached to device.
- 2) The antenna must use a unique type of connector to attach to the device.
- 3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

7.2. Result

The EUT's antenna is integrated on the Spring PCB and no consideration of replacement. The best case gain of the antenna is 3.0dBi

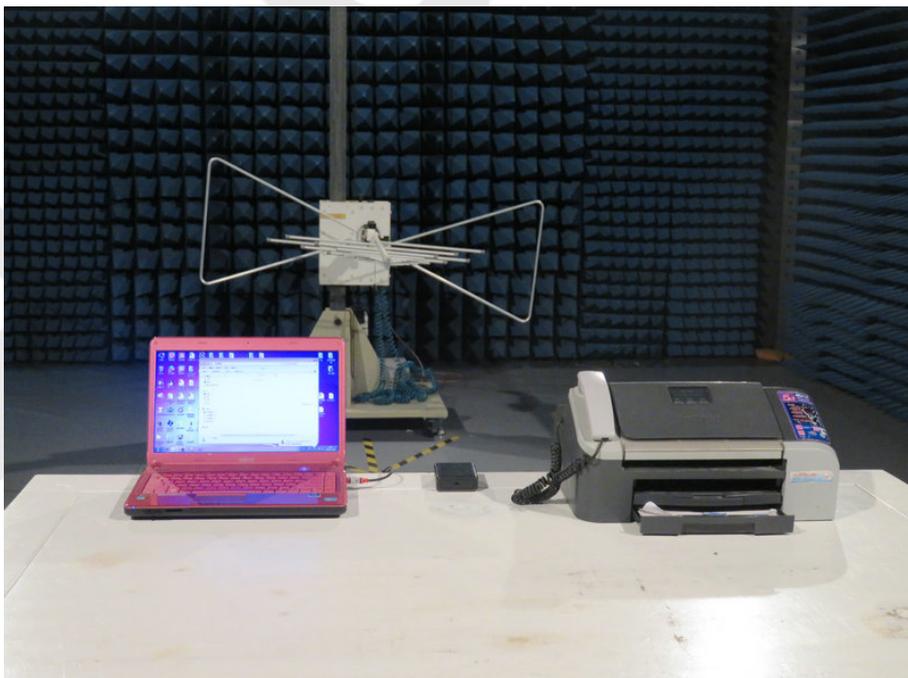


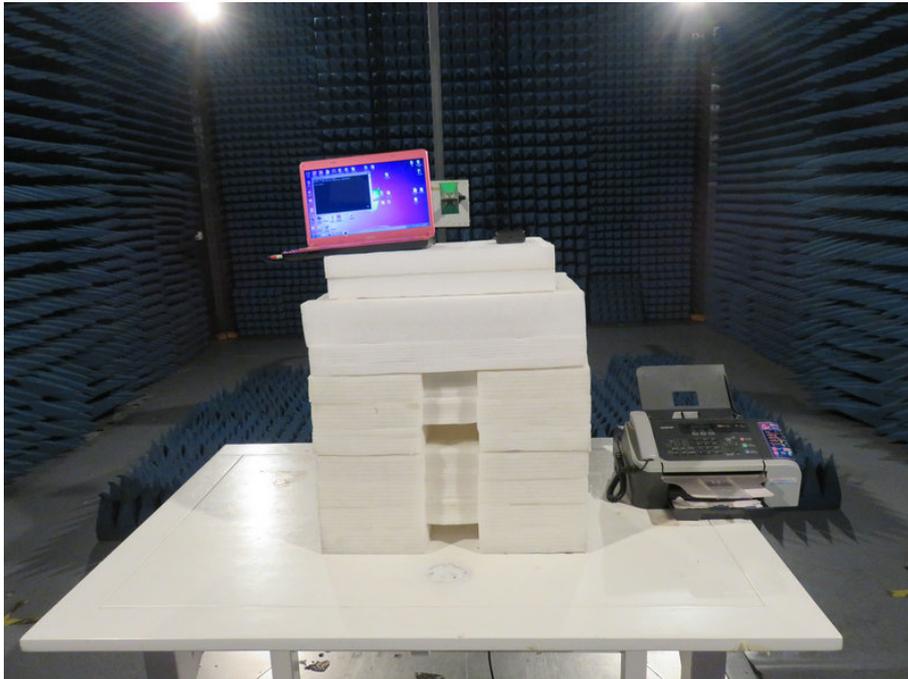
8. TEST SETUP PHOTOGRAPH

8.1. Photo of Conducted Emission Test



8.2. Photo of Radiation Emission Test





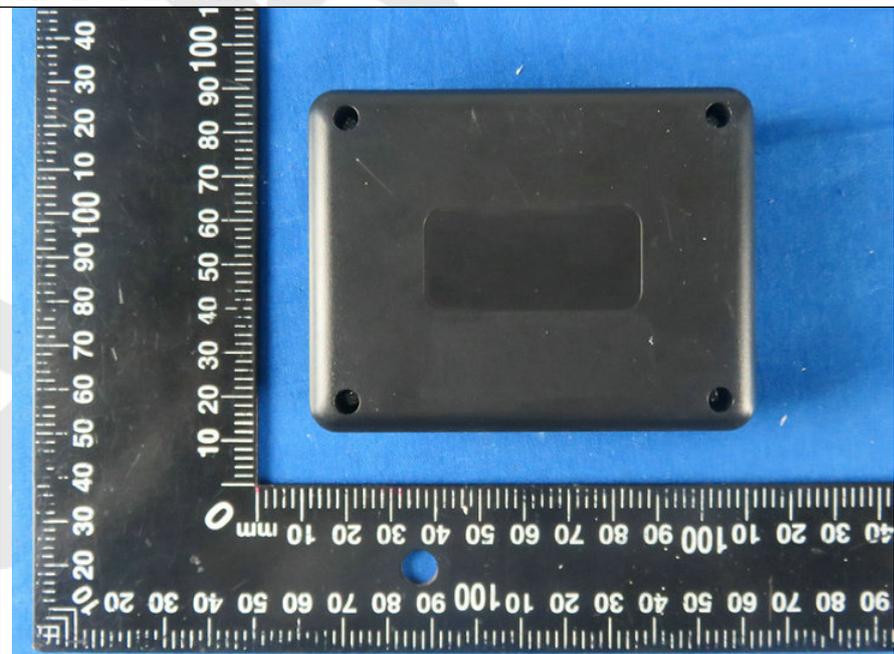
Anbotek

APPENDIX I (EXTERNAL PHOTOS)

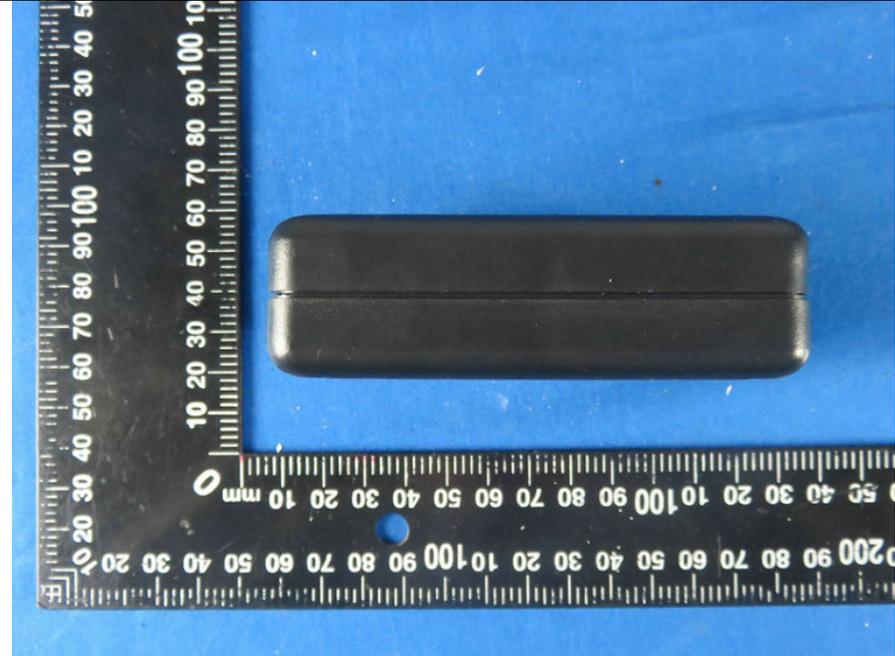
1. Figure
The EUT-Top View



2. Figure
The EUT-Bottom View



3. Figure
The EUT-Front View



4. Figure
The EUT-Back View



5. Figure
The EUT-Right View

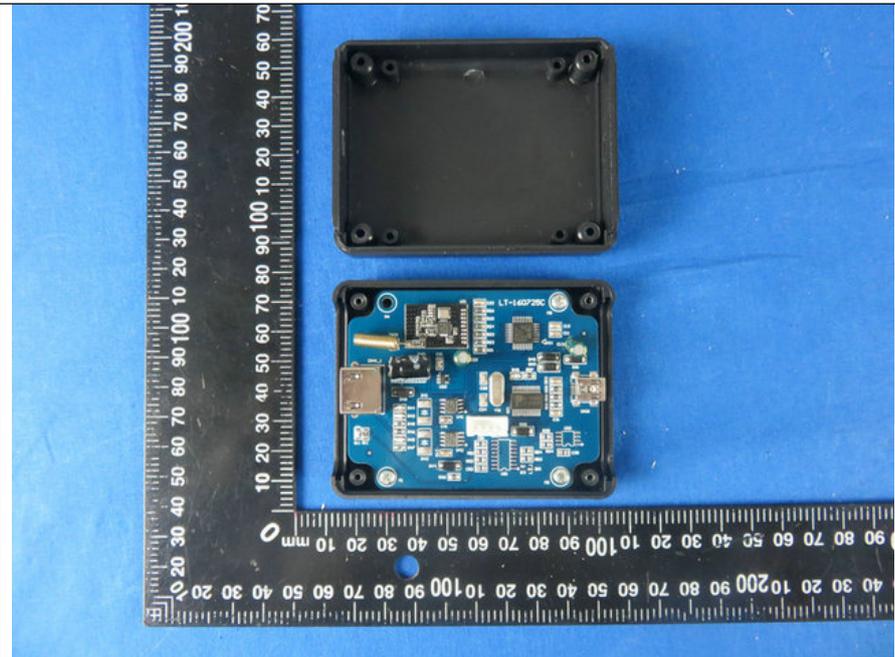


6. Figure
The EUT-Left View

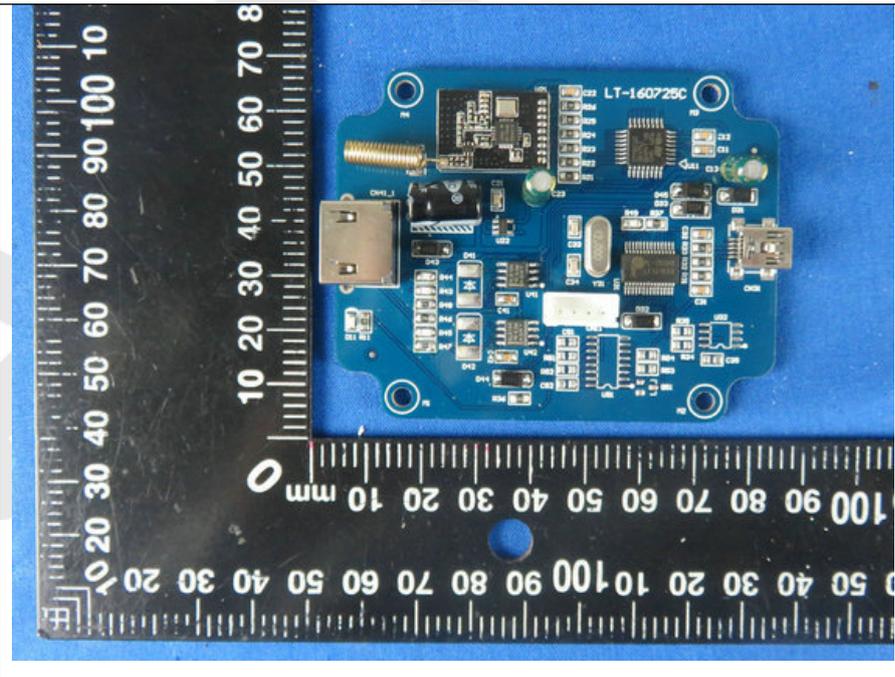


APPENDIX II (INTERNAL PHOTOS)

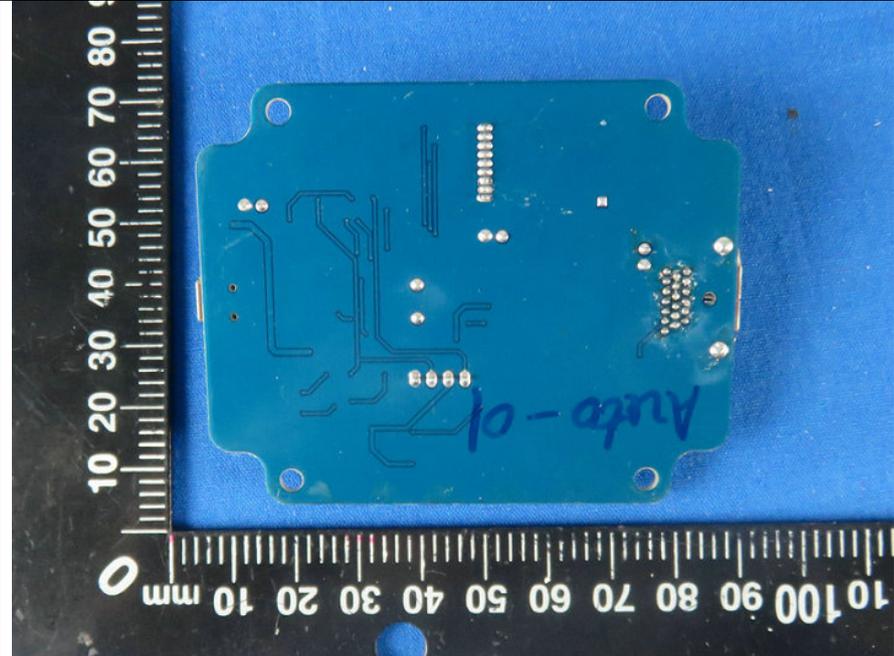
1. Figure
The EUT-Inside View



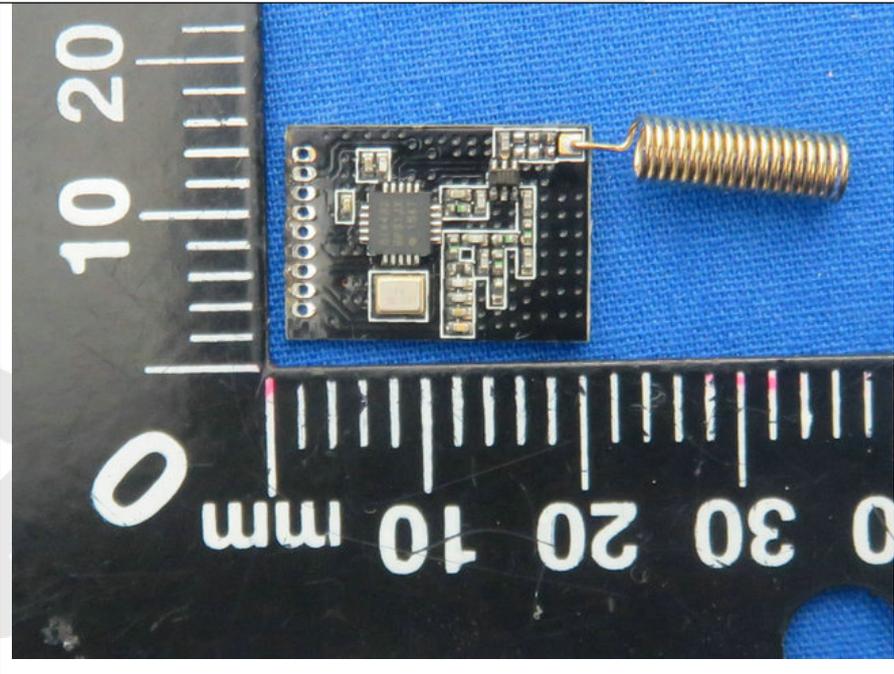
2. Figure
PCB of the EUT-Front View



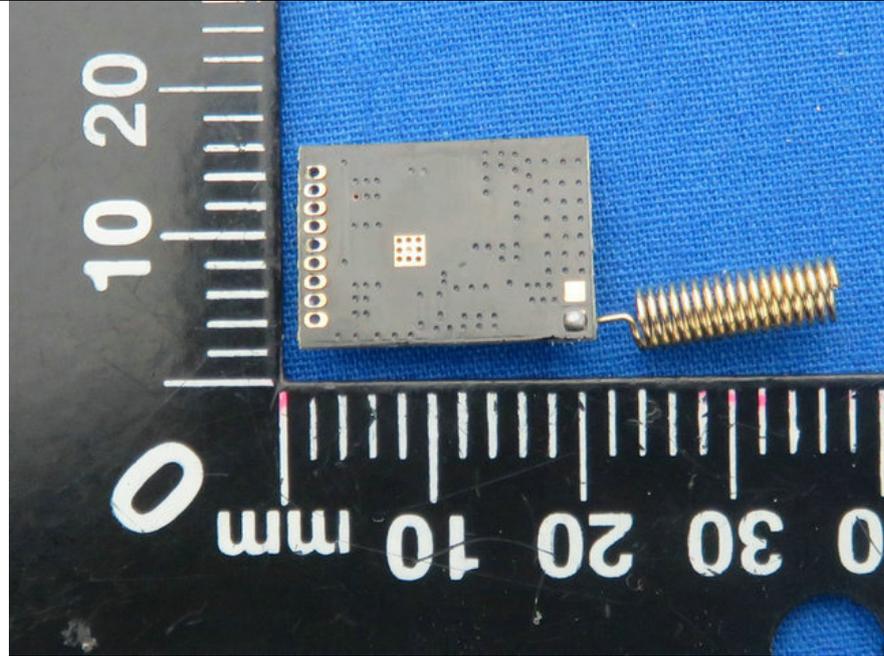
3. Figure
PCB of the EUT-Back View



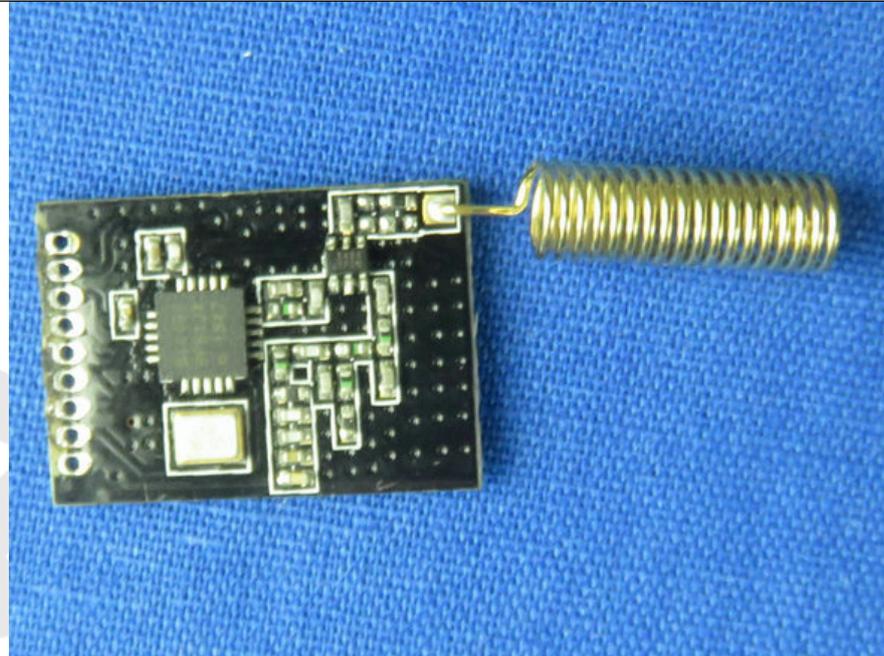
4. Figure
PCB of the EUT-Front View



5. Figure
PCB of the EUT-Back View



6. Figure
PCB of the EUT-Front View



7. Figure
PCB of the EUT-Back View

