FCC Test Report

Part 15 subpart C

Client Information:

Applicant: The Active Network, Ltd. (Xian)

Applicant add.: D201 Qinfengge, No. 68 Kejier Rd, Xian, China

Product Information:

Product Name: UHF Bib Tag Reader

Model No.: TUHF-READER-3920

Derivative model No.: N/A

Brand Name: N/A

FCC ID: 2AGTK3920

Standards: CFR 47 FCC PART 15 SUBPART C: 2016 section 15.249

Prepared By:

ATS Electronic Technology Co., Ltd.

Add. : 3/F, Building A, No. 1 Hedong Three Road, Jinxia Communityt, Changan Town, DongGuan City, GuangDong, P.R.China

Date of Receipt: Apr. 18, 2016 Date of Test: Apr. 19~24, 2016

Date of Issue: Apr. 24, 2016 Test Result: Pass

This device described above has been tested by ATS Electronic Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: Vera Wang **Approved by:** Simon Zeng

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2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Field Strength of Fundamental	FCC PART 15 C section 15.249 (a)	ANSI C63.10: Clause 6.6	PASS
Field Strength of Unwanted Emissions	FCC PART 15 C section 15.249 (a) section 15.249 (d)	ANSI C63.10: Clause 6.4, 6.6 and 6.7	PASS
Band Edges	FCC PART 15 C section 15.249 (d)	ANSI C63.10: Clause 6.9.2	PASS
Occupied Bandwidth	FCC PART 15 C section 15.215(c)	ANSI C63.10: Clause 6.9.1	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 C section 15.207	ANSI C63.10: Clause 6.2	PASS

Remark:
EUT: In this whole report EUT means Equipment Under Test.
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.
ANSI C63.10: the detail version is ANSI C63.10:2009 in the whole report.

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, the maximum value of the uncertainty as below:

No.	Item	Uncertainty
1	Conducted Emission Test	1.20dB
2	Radiated Emission Test	3.30dB
3	RF power,conducted	0.16dB
4	RF power density,conducted	0.24dB
5	Spurious emissions,conducted	0.21dB
6	All emissions,radiated(<1G)	4.68dB
7	All emissions,radiated(>1G)	4.89dB

3 General Information

3.1 General Description of EUT

Manufacturer:	The Active Network, Ltd. (Xian)
Manufacturer Address:	D201 Qinfengge, No. 68 Kejier Rd, Xian, China
EUT Name:	UHF Bib Tag Reader
Model No.:	TUHF-READER-3920
Operation frequency:	912.5 MHz to 917.5 MHz
Number of channel:	11 channels
Modulation Type and Antenna Type:	ASK UHF RFID Plate Antenna
Data rate:	1Mb/s
MIMO mode:	EUT supports the MIMO mode (4x4)
H/W No.:	V1.0
S/W No.:	V00
Antenna Gain:	5 dBi
Brand Name:	N/A
Derivative model No.:	N/A
Power Supply Range:	Battery: 12V 7.2Ah sealed lead-acid battery, Adapter: INPUT-100-120VAC 3.0A, 200-240VAC 1.5A OUTPUT-13.8V 7.2A
Power Supply:	DC 12V from sealed lead-acid battery, AC 120V/60Hz for adapter, DC 13.8V from adapter DC 12V from external battery
Power Cord:	1.7 m x 2 wires unscreened DC cable (adapter)
Signal Cable:	N/A

3.2 Test Location

All tests were performed at:
Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China
Tel.: +86.769.82020499 Fax.: +86.769.82020495

The FCC Registration No. of Dongguan Yaxu (AiT) Technology Limited is 248337.

Description of Channel:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	912.5	05	914.5	09	916.5
02	913.0	06	915.0	10	917.0
03	913.5	07	915.5	11	917.5
04	914.0	08	916.0		

4 Description of Test conditions

4.1 E.U.T. Operation

Test Voltage:	DC 12V from sealed lead-acid battery, AC 120V/60Hz for adapter, DC 13.8V from adapter DC 12V from external battery
Test mode:	The EUT supports MIMO mode(4x4). Pre-test EUT in MIMO(4x4) and single ANT modes, find the worst case in MIMO mode(4x4).. Pre-test EUT in B/O & AC & external B/O modes, find the worst case in B/O mode.
Test mode description:	B/O mode: EUT operate stand-alone & powered by internal 12V lead-acid battery AC mode: EUT operate & connect the adapter to the charger port to charge the internal battery External B/O mode: EUT operate stand-alone & powered by external 12V lead-acid battery
Temperature:	20.0 -25.0 °C
Humidity:	38-50 % RH
Atmospheric Pressure:	1000 -1010 mbar
Test frequencies and frequency range:	According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table: According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Note:

1.Connect the EUT as above block diagram of configuration, Run the software, set the transmit serial port/power/channel/packet type/data type/hopping or not, send configuration,than EUT enter the TX mode.

2.Set EUT in continuous transmission signal mode.

3.Using the laptop to control the fixed transmitting frequency and other test mode. After finishing the test setting, the notebook will be removed during measurements.

4.This product is performing independent test under the battery is fully charged.

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

4.2 EUT Peripheral List

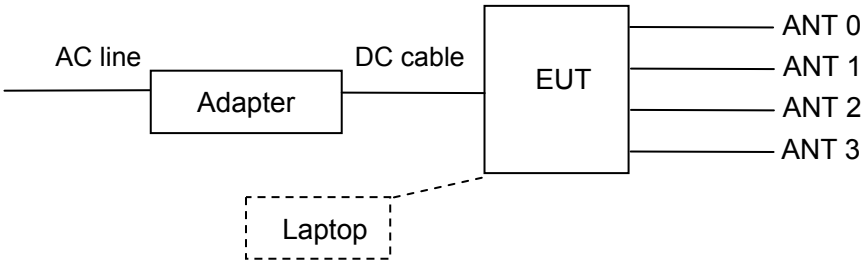
No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	adapter	MEAN WELL	N/A	PA-120P -13C	N/A	1.1m/ unshielded/ undetachable	N/A
2	UHF RFID Plate Antenna	N/A	N/A	N/A	N/A	N/A	3.4m/ shielded

4.3 Test Peripheral List

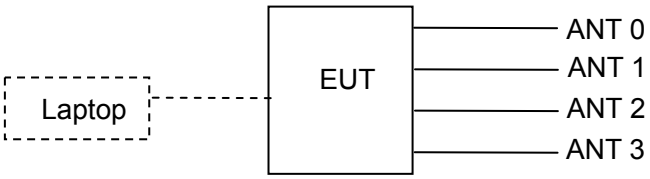
No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	Lap top	ASUS	N/A	X401A	X16-96072	N/A	N/A
2	ethernet cable	N/A	N/A	N/A	N/A	N/A	1.5m/ unshielded

4.4 Description of Test setup

Conducted Emission Test Setup



Radiated Emission Test Setup



Note:

1. Connect the EUT as above block diagram of configuration, run the software, click the connect button waiting for becoming red, set the frequency, than EUT enter the continuous transmission signal mode. The notebook and the ethernet cable will be removed during measurements.
2. This product is performing independent test under the battery is fully charged.

5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2015.06.29	2016.06.28
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2015.06.29	2016.06.28
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2015.06.29	2016.06.28
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2015.06.29	2016.06.28
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2015.06.29	2016.06.28
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2015.06.29	2016.06.28
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.29	2016.06.28
8	EMI Test Receiver	R&S	ESCI	100124	2015.06.29	2016.06.28
9	LISN	Kyoritsu	KNW-242	8-837-4	2015.06.29	2016.06.28
10	LISN	Kyoritsu	KNW-407	8-1789-3	2015.06.29	2016.06.28
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.29	2016.06.28
12	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.29	2016.06.28
13	EMI Test Receiver	Rohde & Schwarz	ESIB26	100394	2015.06.29	2016.06.28
14	Radiated Cable 1# (30MHz-1GHz)	FUJIKURA	5D-2W	01	2016.01.04	2017.01.03
15	Radiated Cable 2# (1GHz -25GHz)	FUJIKURA	10D2W	02	2015.12.25	2016.12.24
16	Conducted Cable 1#(9KHz-30MHz)	FUJIKURA	1D-2W	01	2016.01.04	2017.01.03
Note: N/A						

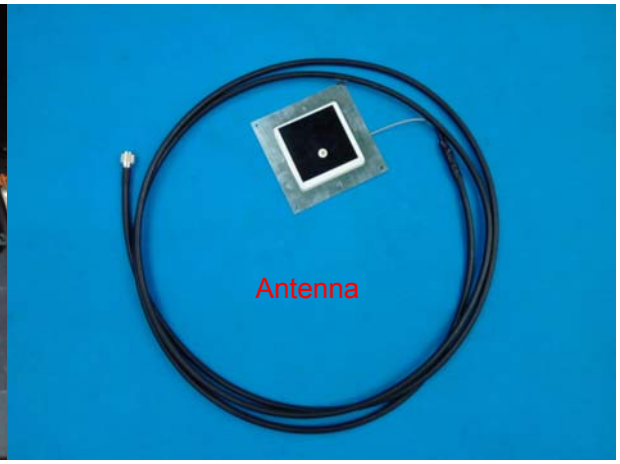
6 Test Result

6.1 Antenna Requirement

Standard requirement

EUT Antenna

The antenna is UHF RFID Plate Antenna with non-standard Reversed TNC end connector and no consideration of replacement. The maximum gain of the antenna is 5 dBi.



Test result: The unit does meet the FCC requirements.

6.2 Field Strength of Fundamental& Field Strength of Unwanted Emissions& Band Edge

Test Requirement: FCC Part15 C section 15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBμV/m @ 3m)	Field Strength of Harmonics (dBμV/m @ 3m)
902 to 928	94.0	54.0
2400 to 2483.5	94.0	54.0
5725 to 5875	94.0	54.0
24000 to 24250	108.0	68.0

(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 Section 15.209, whichever is the lesser attenuation.

Limits: The fundamental frequency rang is in the frequency band of the EUT is 912.5MHz~917.5MHz.

The limit for QP field strength dBμV/m for the fundamental frequency = 94.0 dBμV/m.

No fundamental is allowed in the restricted bands.

The limit for QP field strength dBμV/m for the harmonics = 54.0 dBμV/m.

Test Method: ANSI C63.10: Clause 6.4, 6.6 and 6.7 for Field Strength of Fundamental& Field Strength of Unwanted Emissions

ANSI C63.10: Clause 6.9.2 for Band Edge

Measurement Distance: 3m (Semi-Anechoic Chamber)

Frequency range 9 kHz – 10 GHz for transmitting mode.

Test instrumentation resolution bandwidth
9 kHz (9 kHz - 30 MHz), 120 kHz (30 MHz - 1000 MHz), 1 MHz (1000 MHz – 10 GHz)

Detector: For PK and QP value:

RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

RBW = 1 MHz for f ≥ 1 GHz,

VBW =10 Hz

Sweep = auto

Detector function = peak

Trace = max hold

Test Procedure:

1)9 kHz to 30 MHz emissions:

For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT, During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2)30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3)1 GHz to 10 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

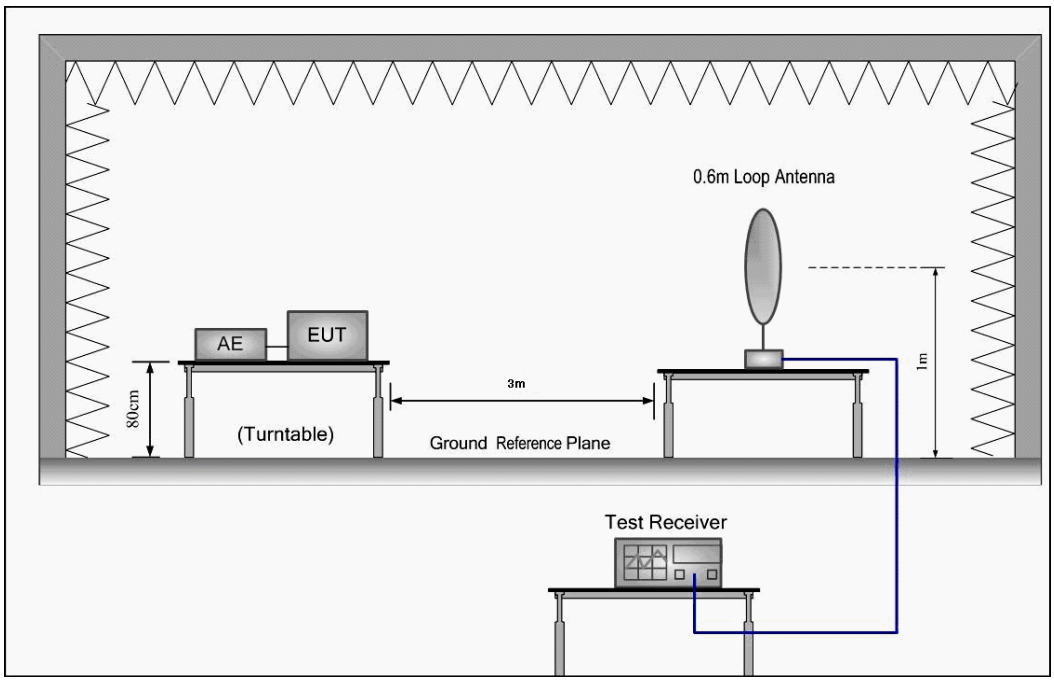
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

For the radiated emission test above 1GHz:

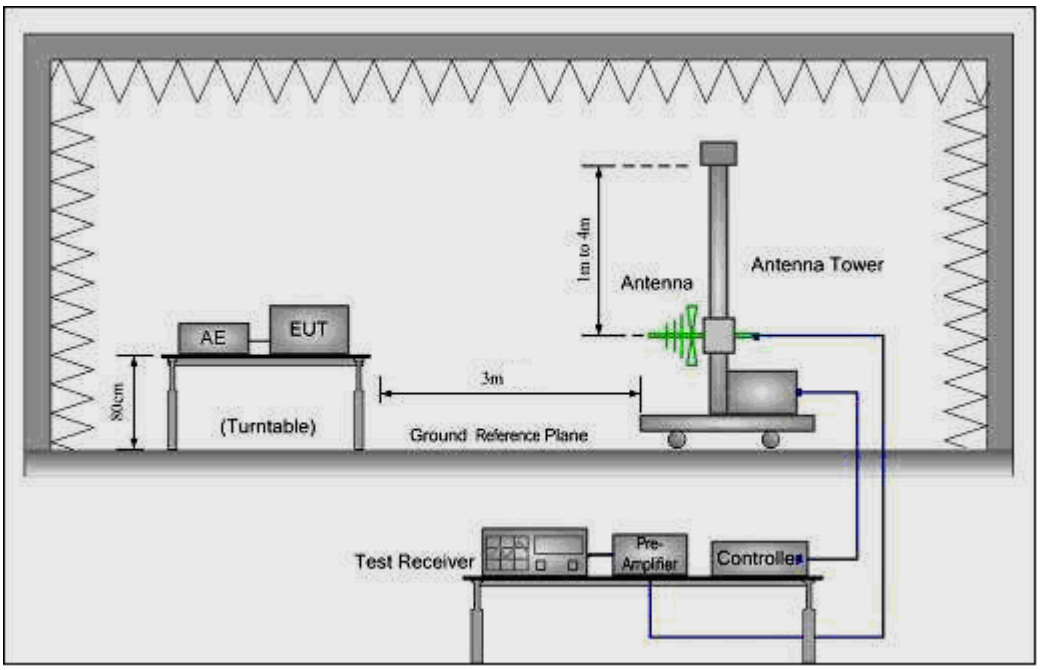
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Test Configuration:

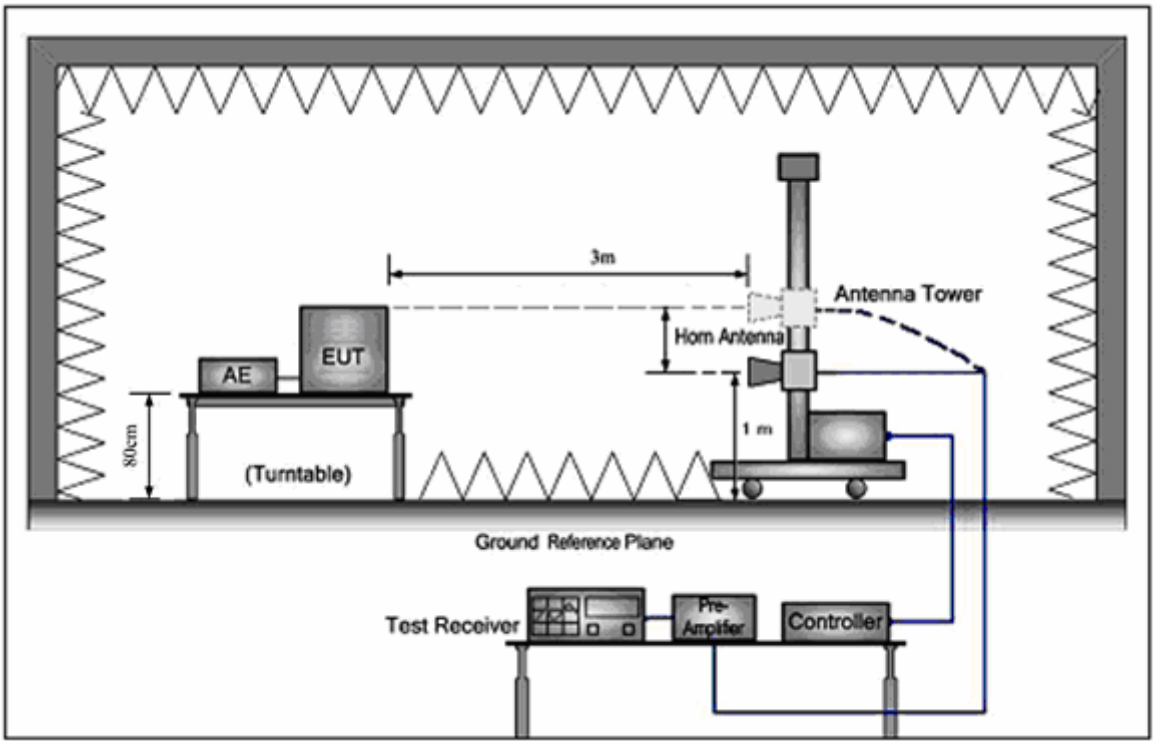
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



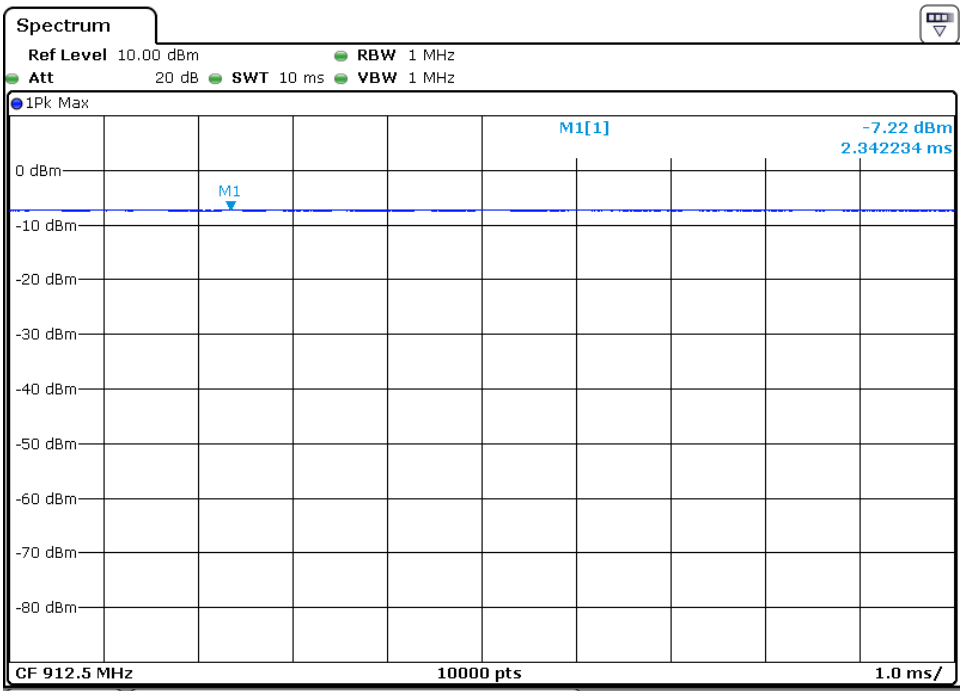
3) 1 GHz to 10 GHz emissions:



The field strength is calculated by adding the Antenna Factor, Cable Loss & Per-amplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss – Preamplifier Factor

7.2.1 Duty cycle measurement:



7.2.2 Fundamental field strength measurement (MIMO[4x4])

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type	Antenna polarization
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
912.5	88.02	2.91	90.93	94.00	-3.07	QUASI-PEAK	V
912.5	88.57	2.91	91.48	94.00	-2.52	QUASI-PEAK	H
915.0	89.01	2.98	91.99	94.00	-2.01	QUASI-PEAK	V
915.0	88.11	2.98	91.09	94.00	-2.91	QUASI-PEAK	H
917.5	88.58	3.06	91.64	94.00	-2.36	QUASI-PEAK	V
917.5	88.41	3.06	91.47	94.00	-2.53	QUASI-PEAK	H

Note: Measurement Level = Reading Level + Factor
Factor=Ant Factor + Cable Loss– Pre-amplifier.

7.2.3 Radiated Emissions Test Data (MIMO[4x4])

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

EUT：	UHF Bib Tag Reader	Model Name ：	TUHF-READER-3920
Temperature：	25 ℃	Test Data	2016-04-22
Pressure：	1010 hPa	Relative Humidity：	50%
Test Mode ：	TX mode	Test Voltage ：	DC 12V from battery
Measurement Distance	3 m	Frenqucy Range	30MHz to 1GHz
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
68.8721	55.89	-18.63	37.26	40.00	-2.74	QUASI-PEAK
84.1100	53.79	-17.98	35.81	40.00	-4.19	QUASI-PEAK
108.6470	52.95	-15.44	37.51	43.50	-5.99	QUASI-PEAK
143.3261	50.59	-15.13	35.46	43.50	-8.04	QUASI-PEAK
250.3012	51.37	-13.57	37.80	46.00	-8.20	QUASI-PEAK
375.9385	47.60	-7.54	40.06	46.00	-5.94	QUASI-PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
51.6616	49.80	-19.18	30.62	40.00	-9.38	QUASI-PEAK
71.3300	56.21	-19.05	37.16	40.00	-2.84	QUASI-PEAK
108.6470	50.87	-13.44	37.43	43.50	-6.07	QUASI-PEAK
145.3506	54.45	-16.09	38.36	43.50	-5.14	QUASI-PEAK
250.3012	49.40	-13.57	35.83	46.00	-10.17	QUASI-PEAK
375.9385	46.87	-7.54	39.33	46.00	-6.67	QUASI-PEAK

Note:

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss– Pre-amplifier

Low Channel: 912.5 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
49.0145	41.86	-14.21	27.65	40.00	-12.35	QUASI-PEAK
74.3955	47.37	-18.92	28.45	40.00	-11.55	QUASI-PEAK
106.7587	47.58	-15.50	32.08	43.50	-11.42	QUASI-PEAK
147.9214	45.94	-15.51	30.43	43.50	-13.07	QUASI-PEAK
260.1444	48.67	-12.82	35.85	46.00	-10.15	QUASI-PEAK
375.9385	45.86	-7.54	38.32	46.00	-7.68	QUASI-PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
49.7068	45.63	-18.65	26.98	40.00	-13.02	QUASI-PEAK
74.3955	47.44	-19.18	28.26	40.00	-11.74	QUASI-PEAK
84.1100	47.46	-18.69	28.77	40.00	-11.23	QUASI-PEAK
147.9214	47.83	-15.71	32.12	43.50	-11.38	QUASI-PEAK
197.2001	44.12	-16.81	27.31	43.50	-16.19	QUASI-PEAK
501.1790	39.85	-5.61	34.24	46.00	-11.76	QUASI-PEAK

Note:

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss– Pre-amplifier

Low Channel: 915.0 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
51.6616	41.02	-14.84	26.18	40.00	-13.82	QUASI-PEAK
68.8721	53.67	-18.63	35.04	40.00	-4.96	QUASI-PEAK
143.3261	49.03	-15.13	33.90	43.50	-9.60	QUASI-PEAK
192.4186	47.51	-14.95	32.56	43.50	-10.94	QUASI-PEAK
250.3012	49.99	-13.57	36.42	46.00	-9.58	QUASI-PEAK
375.9385	47.54	-7.54	40.00	46.00	-6.00	QUASI-PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
51.6616	50.41	-19.18	31.23	40.00	-8.77	QUASI-PEAK
71.3300	56.28	-19.05	37.23	40.00	-2.77	QUASI-PEAK
106.7587	47.95	-13.50	34.45	43.50	-9.05	QUASI-PEAK
143.3261	53.82	-15.72	38.10	43.50	-5.40	QUASI-PEAK
250.3012	49.09	-13.57	35.52	46.00	-10.48	QUASI-PEAK
374.6225	45.66	-7.54	38.12	46.00	-7.88	QUASI-PEAK

Note:

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss– Pre-amplifier

Low Channel: 917.5 MHz

Above 1GHz Field Strength of Unwanted Emissions Measurement

EUT：	UHF Bib Tag Reader	Model Name ：	TUHF-READER-3920
Temperature：	25 ℃	Test Data	2016-04-22
Pressure：	1010 hPa	Relative Humidity：	50%
Test Mode ：	TX mode	Test Voltage ：	DC 12V from battery
Measurement Distance	3 m	Frenqucy Range	1GHz to 10GHz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz for Average. non-restricted band: 100KHz/300KHz for Peak.		

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1825.824	60.64	-9.38	51.26	74.00	-22.74	PEAK
1825.824	48.02	-9.38	38.64	54.00	-15.36	AVERAGE
2737.291	43.30	-3.30	40.00	74.00	-34.00	PEAK
2737.291	35.51	-3.30	32.21	54.00	-21.79	AVERAGE
3613.553	42.68	0.62	43.30	74.00	-30.70	PEAK
3613.553	33.98	0.62	34.60	54.00	-19.40	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1825.824	58.20	-9.38	48.82	74.00	-25.18	PEAK
1825.824	47.56	-9.38	38.18	54.00	-15.82	AVERAGE
2737.291	42.11	-3.30	38.81	74.00	-35.19	PEAK
2737.291	34.61	-3.30	31.31	54.00	-22.69	AVERAGE
3620.034	44.97	0.68	45.65	74.00	-28.35	PEAK
3620.034	34.39	0.68	35.07	54.00	-18.93	AVERAGE

Note:

4~10GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss– Pre-amplifier.

Low Channel: 912.5 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1829.098	62.71	-9.39	53.32	74.00	-20.68	PEAK
1829.098	48.83	-9.39	39.44	54.00	-14.56	AVERAGE
2747.118	44.98	-3.24	41.74	74.00	-32.26	PEAK
2747.118	37.24	-3.24	34.00	54.00	-20.00	AVERAGE
3620.034	42.47	0.68	43.15	74.00	-30.85	PEAK
3620.034	33.76	0.68	34.44	54.00	-19.56	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1829.098	60.48	-9.39	51.09	74.00	-22.91	PEAK
1829.098	49.36	-9.39	39.97	54.00	-14.03	AVERAGE
2761.924	44.37	-3.12	41.25	74.00	-32.75	PEAK
2761.924	35.23	-3.12	32.11	54.00	-21.89	AVERAGE
3620.034	44.53	0.68	45.21	74.00	-28.79	PEAK
3620.034	32.76	0.68	33.44	54.00	-20.56	AVERAGE

Note:

4~10GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss –Preamplifier Factor.

Middle Channel: 915.0 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1835.664	63.51	-9.40	54.11	74.00	-19.89	PEAK
1835.664	49.02	-9.40	39.62	54.00	-14.38	AVERAGE
2752.044	46.36	-3.20	43.16	74.00	-30.84	PEAK
2752.044	36.64	-3.20	33.44	54.00	-20.56	AVERAGE
3672.297	39.69	1.17	40.86	74.00	-33.14	PEAK
3672.297	32.47	1.17	33.64	54.00	-20.36	AVERAGE

(b) Antenna polarization: Vertical

Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
1835.664	60.78	-9.40	51.38	74.00	-22.62	PEAK
1835.664	49.68	-9.40	40.28	54.00	-13.72	AVERAGE
2752.044	43.03	-3.20	39.83	74.00	-34.17	PEAK
2752.044	34.88	-3.20	31.68	54.00	-22.32	AVERAGE
3672.297	43.30	1.17	44.47	74.00	-29.53	PEAK
3672.297	35.07	1.17	36.24	54.00	-17.76	AVERAGE

Note:

4~10GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss –Preamplifier Factor.

Highest Channel : 917.5 MHz

7.2.4 Band Edge Measurement (MIMO[4x4]):

Ant.Pol. H/V	Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Detector Type
Lowest channel: 912.5MHz						
V	902.000	40.33	2.81	43.14	46.00	QUASI-PEAK
H	902.000	37.44	2.81	40.25	46.00	QUASI-PEAK
Highest channel: 917.5 MHz						
V	928.000	37.72	3.11	40.83	46.00	QUASI-PEAK
H	928.000	37.89	3.11	41.00	46.00	QUASI-PEAK

Remark:

1). The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

Test result: The unit does meet the FCC requirements.

7.2.5 Restricted Bands Measurement (MIMO[4x4]):

EUT：	UHF Bib Tag Reader	Model Name ：	TUHF-READER-3920
Temperature：	25 ℃	Test Data	2016-04-22
Pressure：	1010 hPa	Relative Humidity：	50%
Test Mode ：	TX mode	Test Voltage ：	DC 12V from battery
Note：	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 608-614 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 960-1240 MHz. 3. The data of 614MHz and 960MHz was the worst.		

Ant.Pol. H/V	Frequency (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Detector Type
V	614.000	29.78	-1.93	27.85	46.00	QUASI-PEAK
H	614.000	29.45	-1.93	27.52	46.00	QUASI-PEAK
V	960.000	28.76	4.04	32.80	46.00	QUASI-PEAK
H	960.000	28.85	4.04	32.89	46.00	QUASI-PEAK

Remark：

(1) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

6.3 Occupied Bandwidth

Test Requirement: FCC Part 15 C section 15.215

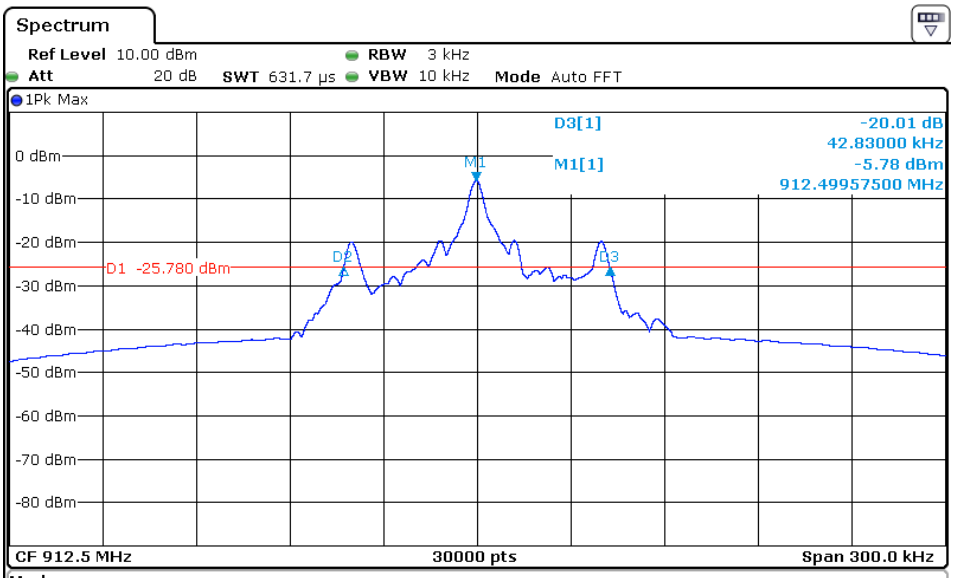
(c)Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Method: ANSI C63.10: Clause 6.9.1

Operation within the band 902 MHz to 928 MHz

Method of measurement: A small sample of the transmitter output was fed into the Spectrum Analyzer and the attached plot was taken.

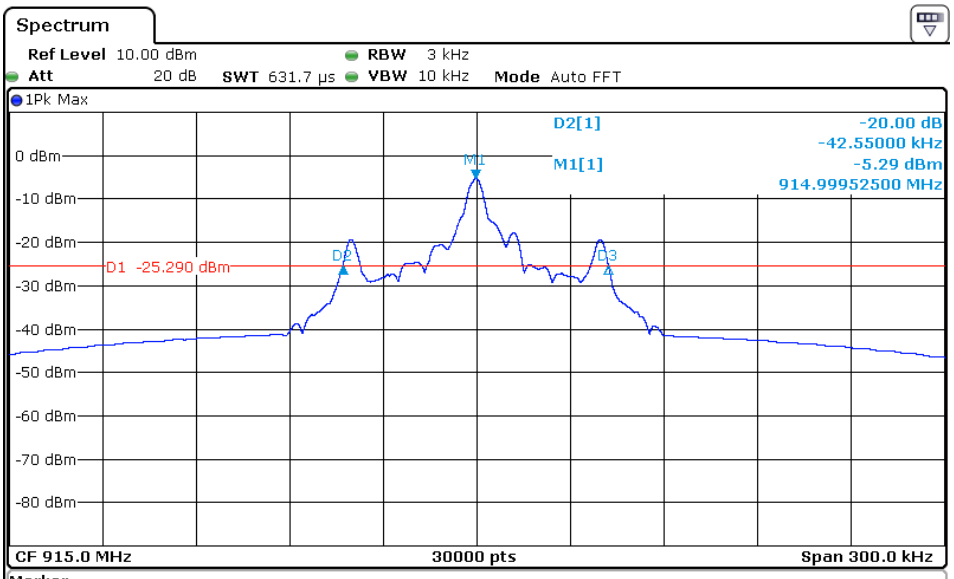
Test in the frequency 912.5MHz (ANT0-20 dB bandwidth) : 85.31KHz



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	912.499575 MHz	-5.78 dBm		
D2	M1	1	-42.48 kHz	-20.00 dB		
D3	M1	1	42.83 kHz	-20.01 dB		

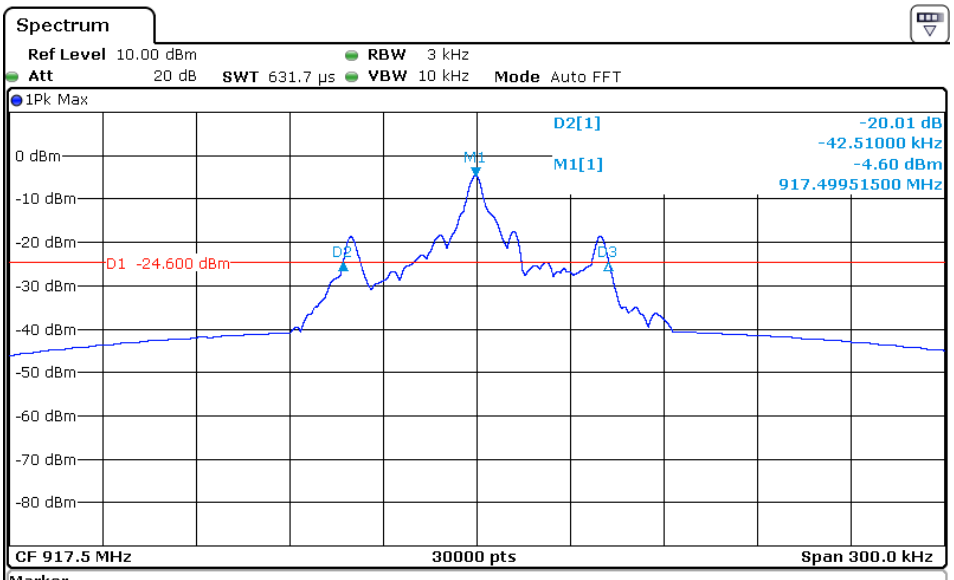
Test in the frequency 915.0MHz (ANT0-20 dB bandwidth) : 85.16KHz



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	914.999525 MHz	-5.29 dBm		
D2	M1	1	-42.55 kHz	-20.00 dB		
D3	M1	1	42.61 kHz	-20.00 dB		

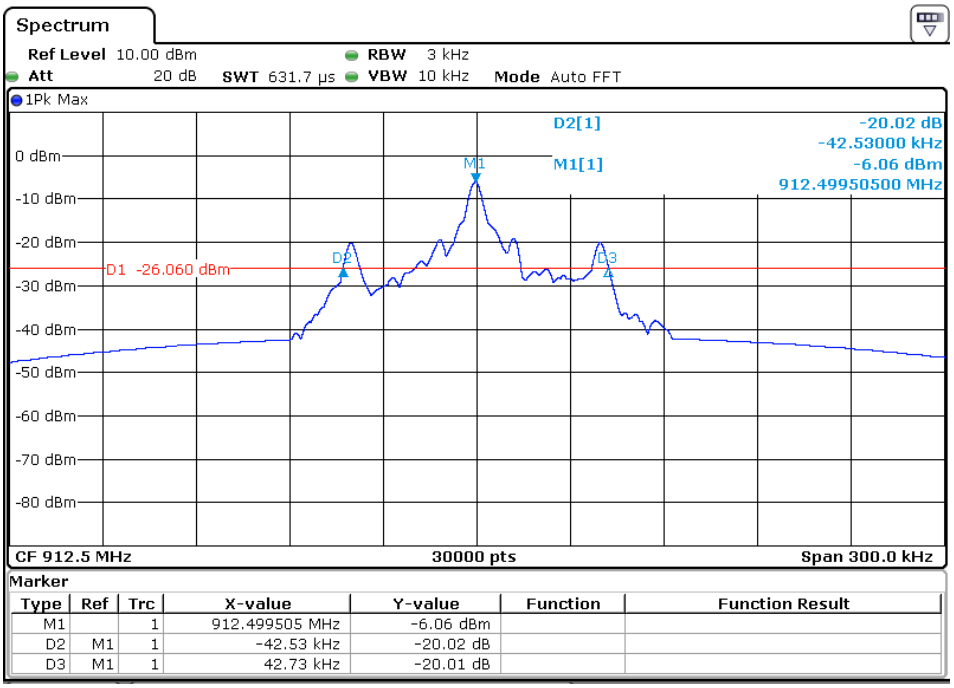
Test in the frequency 917.5MHz (ANT0-20 dB bandwidth) : 85.31KHz



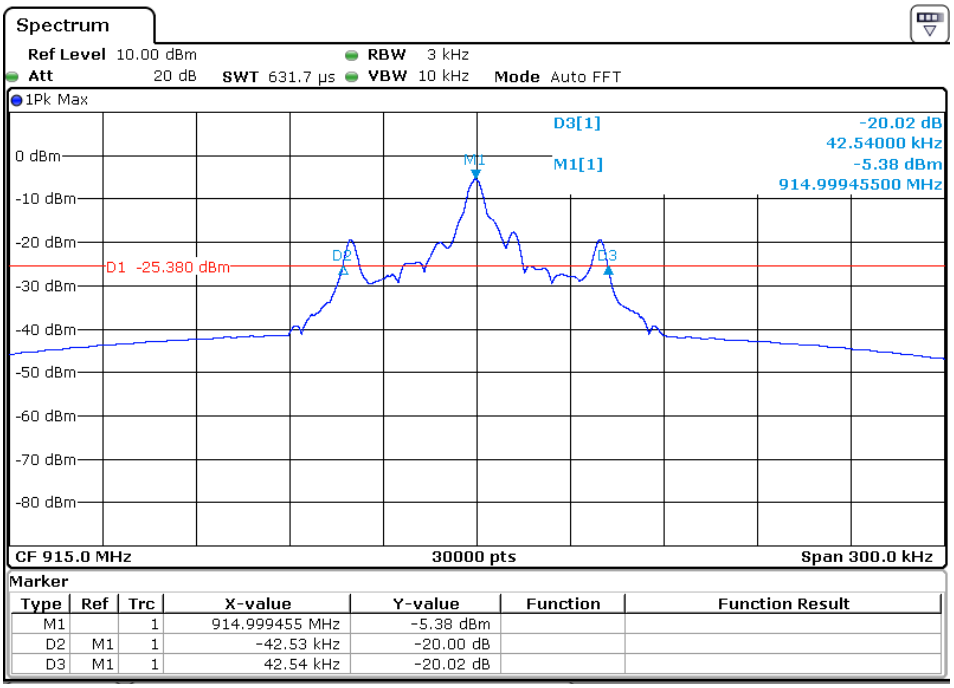
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	917.499515 MHz	-4.60 dBm		
D2	M1	1	-42.51 kHz	-20.01 dB		
D3	M1	1	42.8 kHz	-20.00 dB		

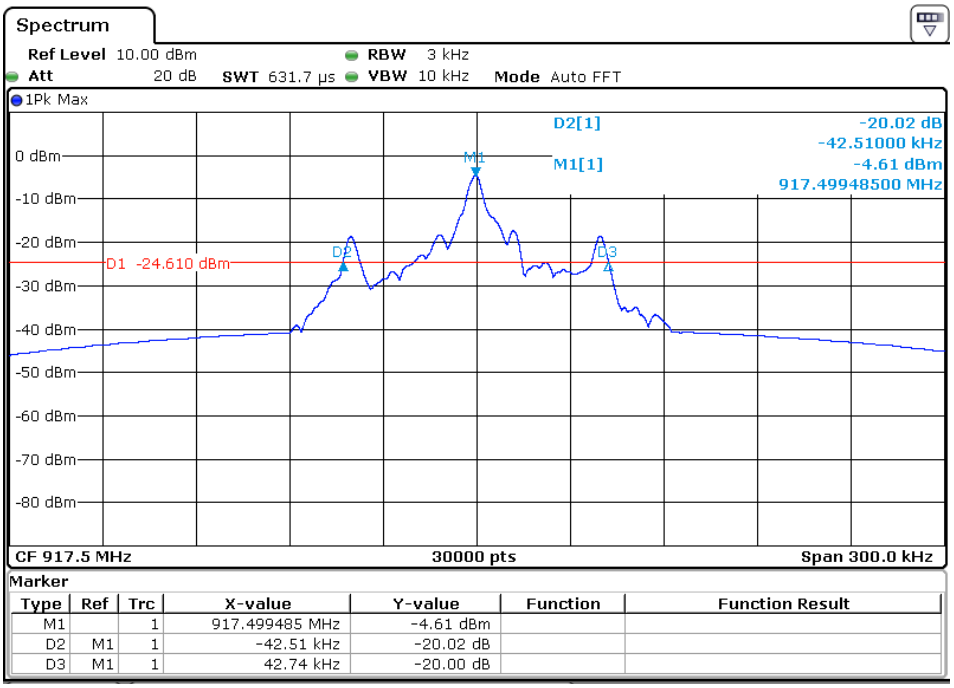
Test in the frequency 912.5MHz (ANT1-20 dB bandwidth) : 85.26KHz



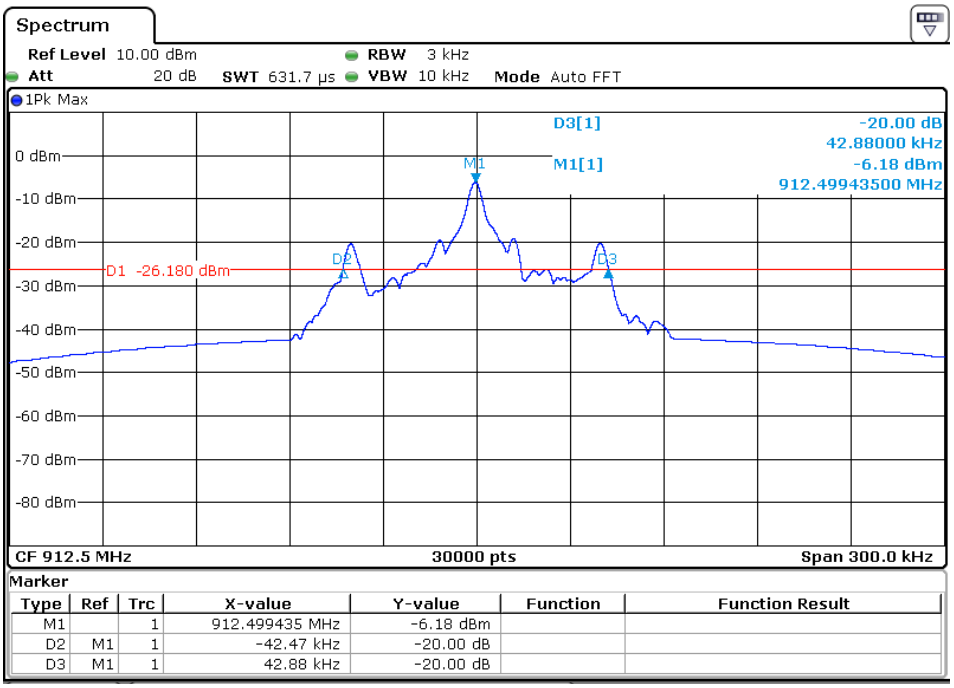
Test in the frequency 915.0MHz (ANT1-20 dB bandwidth) : 85.07KHz



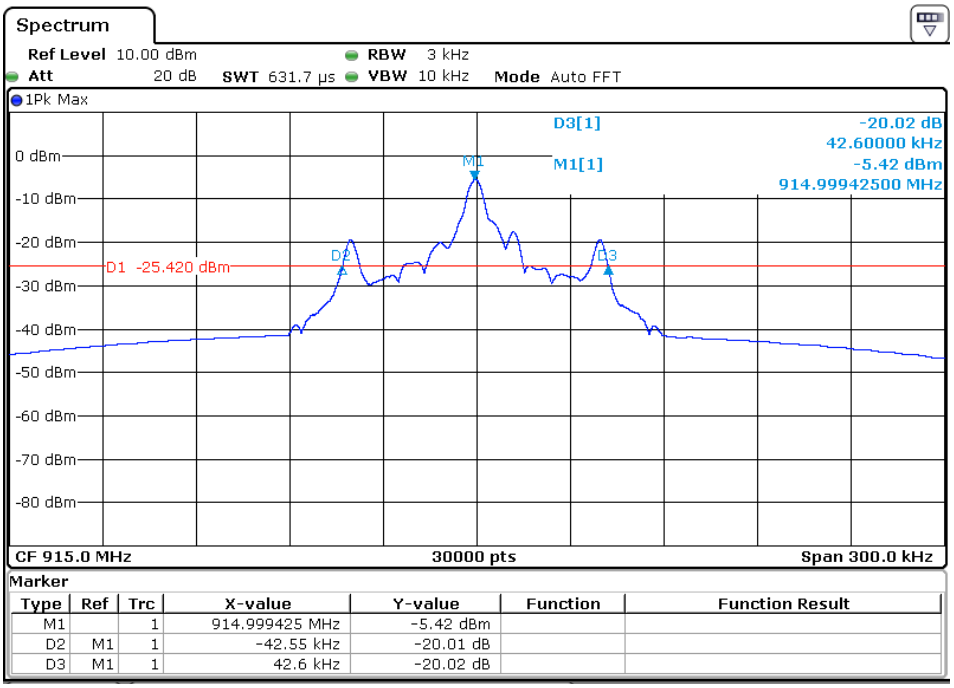
Test in the frequency 917.5MHz (ANT1-20 dB bandwidth) : 85.25KHz



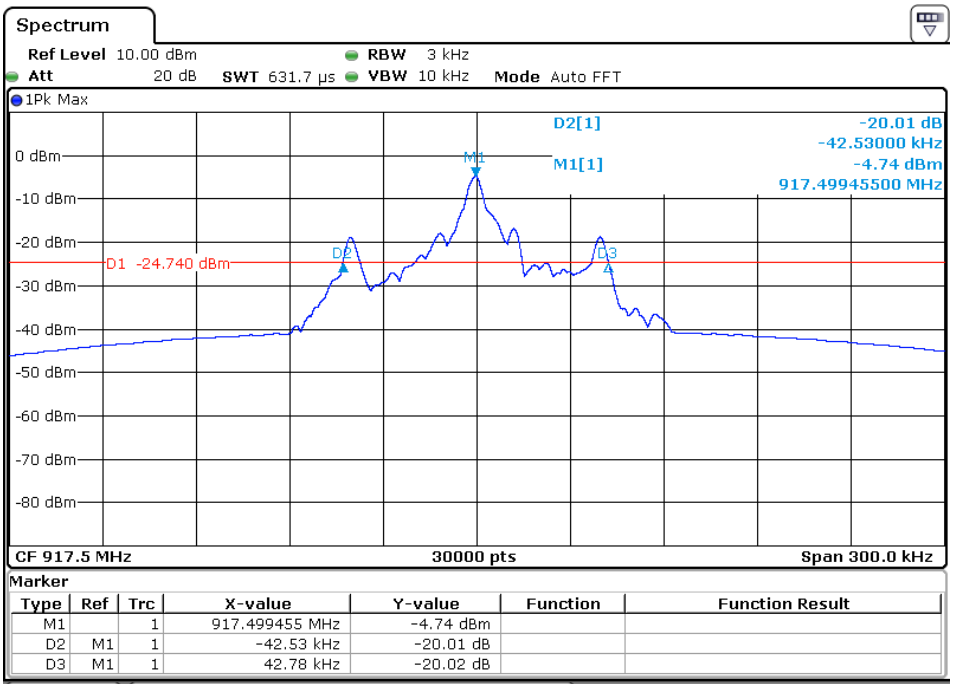
Test in the frequency 912.5MHz (ANT2-20 dB bandwidth) : 85.35KHz



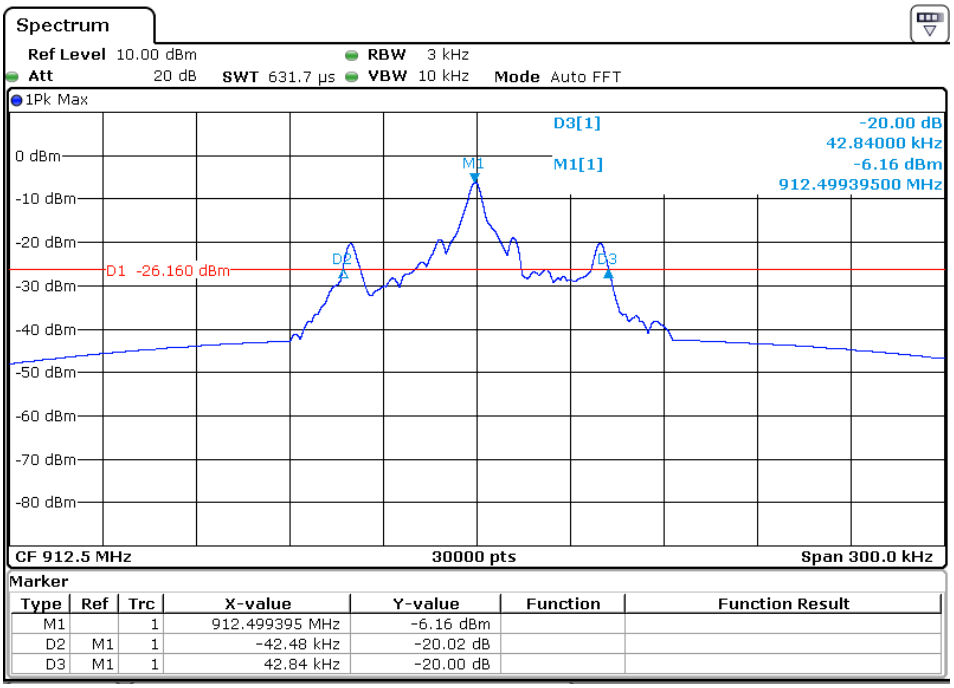
Test in the frequency 915.0MHz (ANT2-20 dB bandwidth) : 85.15KHz



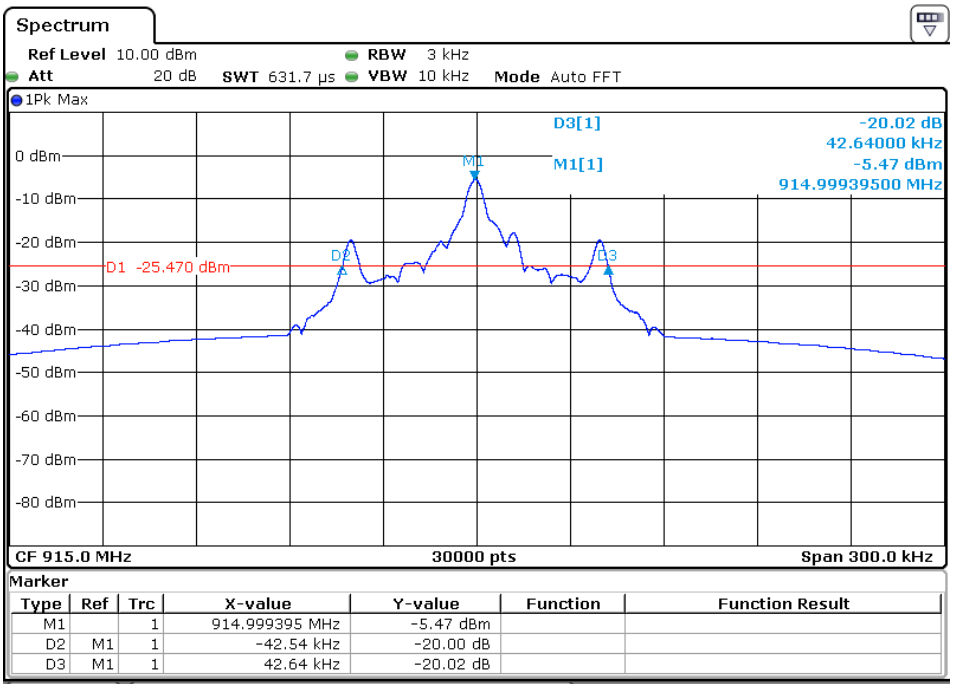
Test in the frequency 917.5MHz (ANT2-20 dB bandwidth) : 85.31KHz



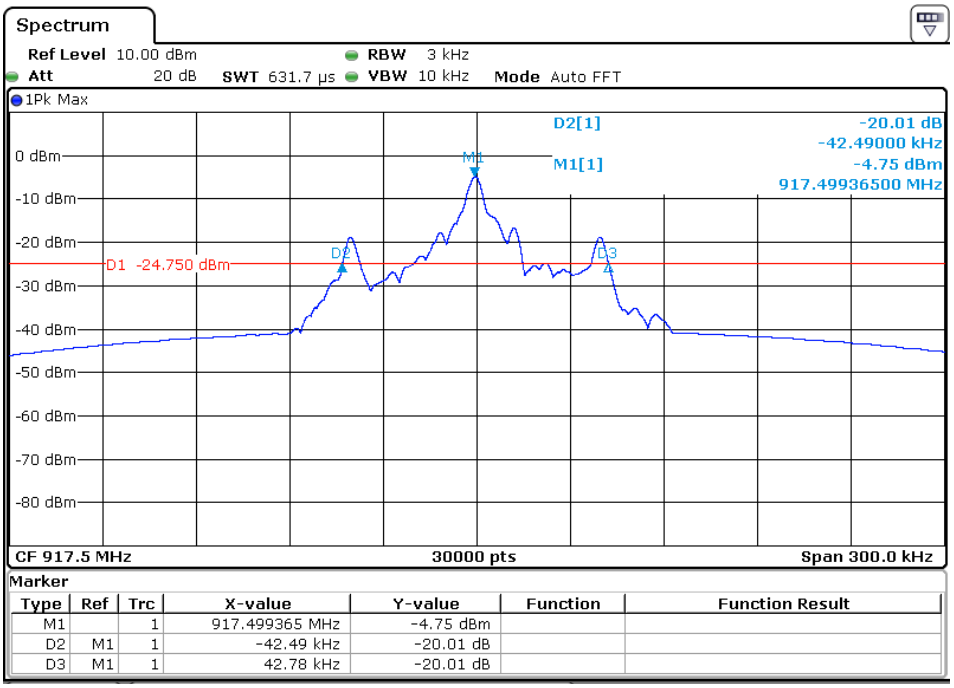
Test in the frequency 912.5MHz (ANT3-20 dB bandwidth) : 85.32KHz



Test in the frequency 915.0MHz (ANT3-20 dB bandwidth) : 85.18KHz



Test in the frequency 917.5MHz (ANT3-20 dB bandwidth) : 85.27KHz



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	917.499365 MHz	-4.75 dBm		
D2	M1	1	-42.49 kHz	-20.01 dB		
D3	M1	1	42.78 kHz	-20.01 dB		

6.4 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

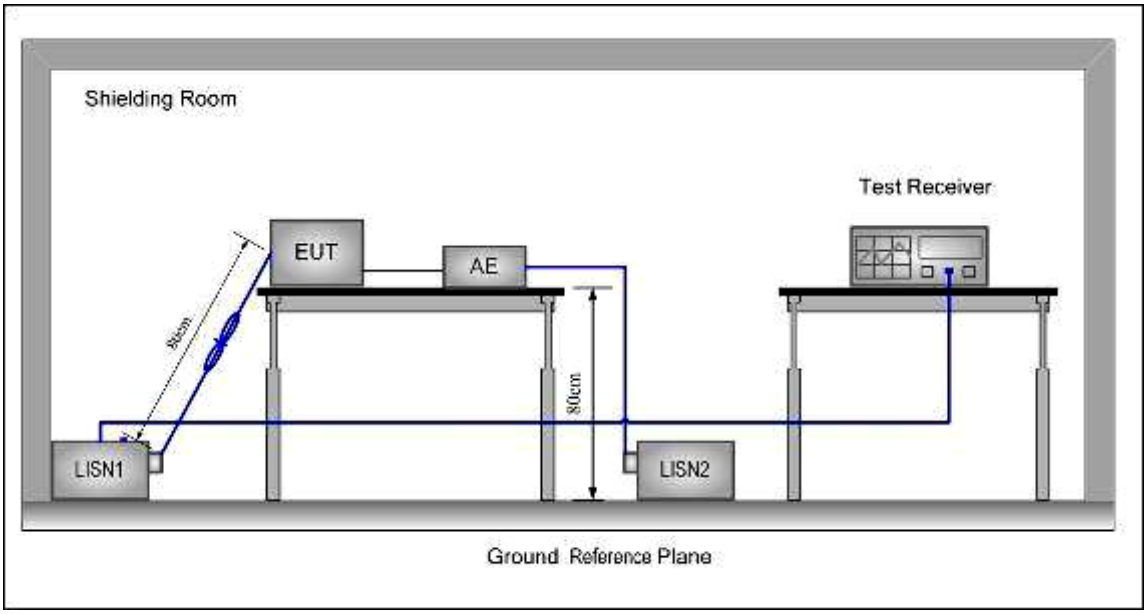
Test Limit

Limits for conducted disturbance at the mains ports

Frequency Range (MHz)	**Limit dB(μV)**	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Test Configuration:



Test procedure:

1. The mains terminal disturbance voltage test was conducted in a shielded room.

2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

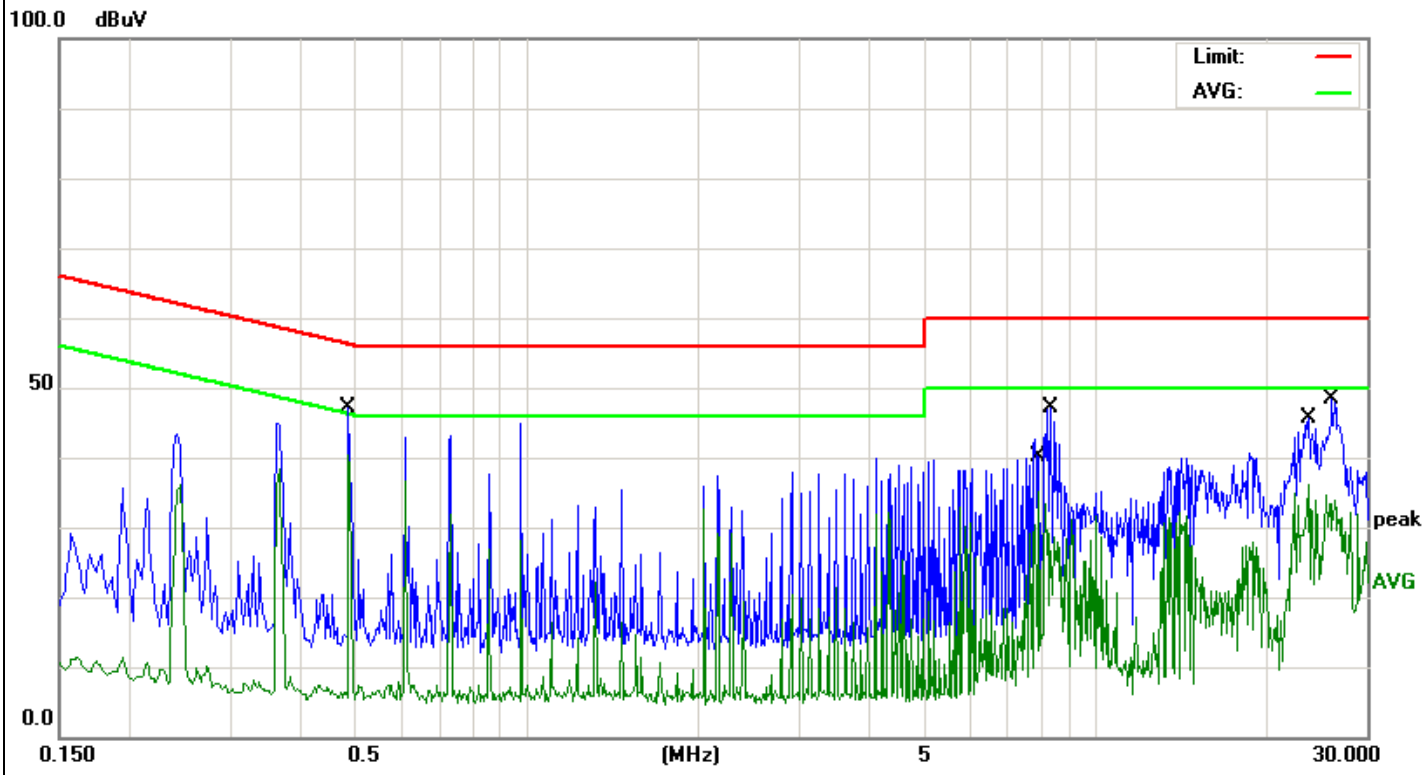
Measurement Data (MIMO[4x4])

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT:

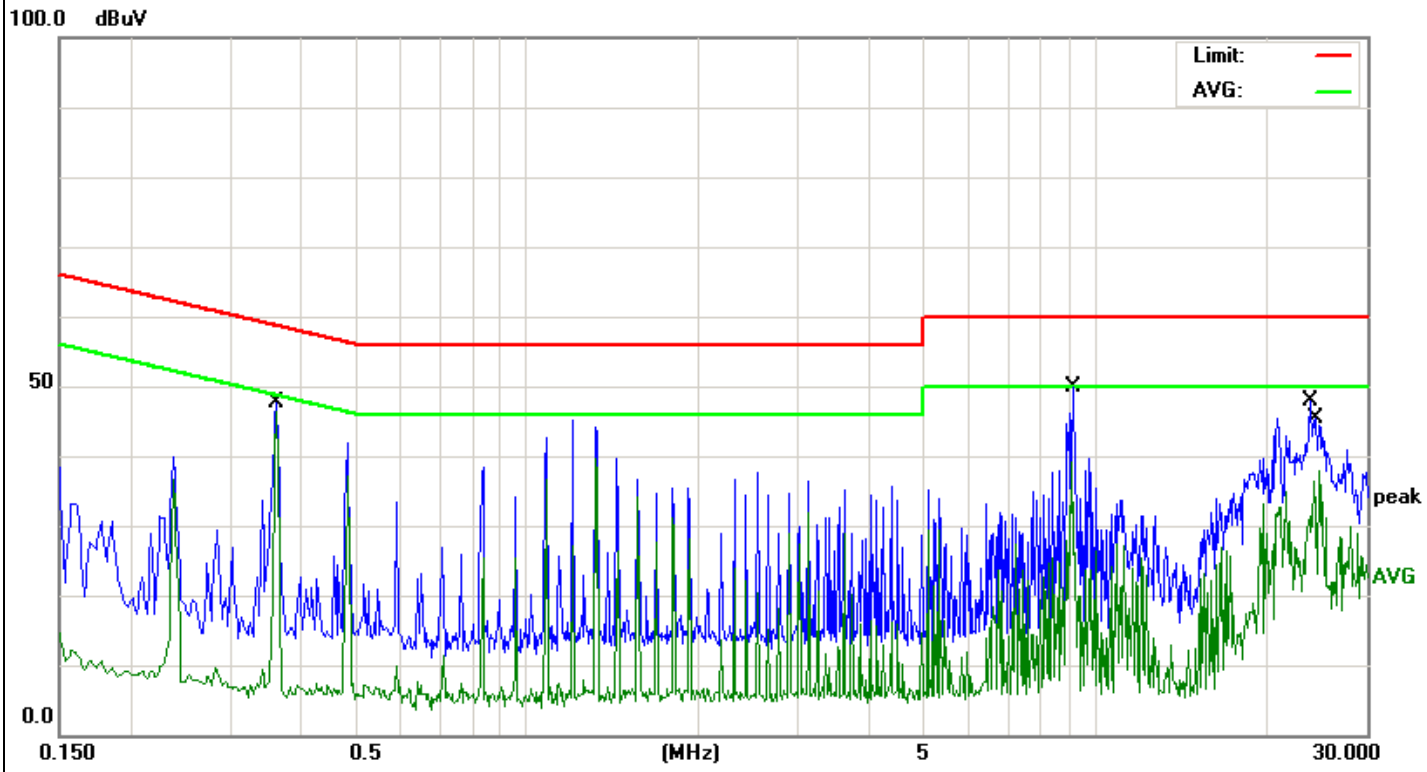
Line



Remark: Factor = LISN Factor + Cable Loss+ Pulse limiter Factor.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.4860	37.09	10.03	47.12	56.24	-9.12	QP
2	*	0.4860	30.45	10.03	40.48	46.24	-5.76	AVG
3		7.9540	24.96	10.19	35.15	50.00	-14.85	AVG
4		8.3540	36.91	10.20	47.11	60.00	-12.89	QP
5		23.7139	33.92	2.10	36.02	50.00	-13.98	AVG
6		26.1259	46.20	2.13	48.33	60.00	-11.67	QP

Neutral



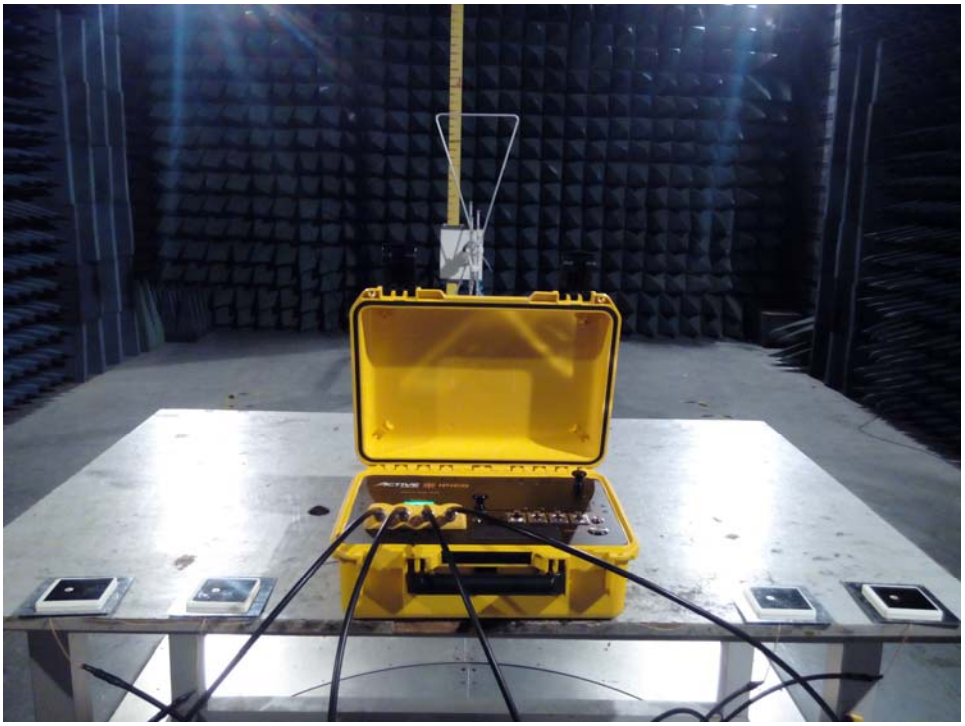
Remark: Factor = LISN Factor + Cable Loss+ Pulse limiter Factor.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.3620	37.50	10.16	47.66	58.68	-11.02	QP
2	*	0.3620	29.84	10.16	40.00	48.68	-8.68	AVG
3		9.0780	28.90	10.21	39.11	50.00	-10.89	AVG
4		9.1140	39.65	10.21	49.86	60.00	-10.14	QP
5		23.8420	45.78	2.10	47.88	60.00	-12.12	QP
6		24.6940	35.75	2.12	37.87	50.00	-12.13	AVG

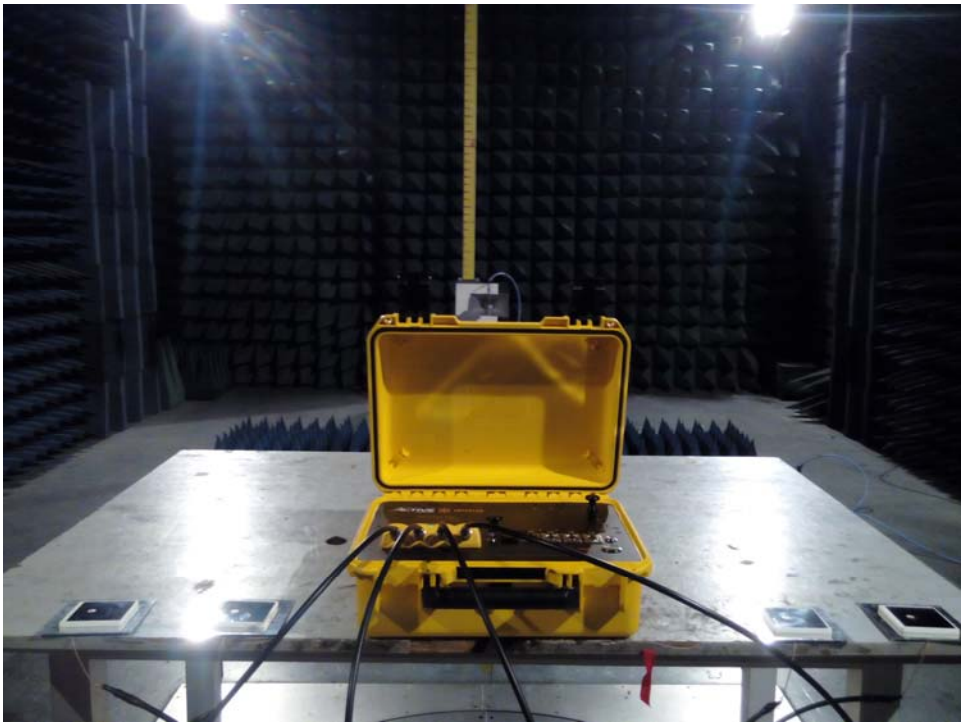
7 Photographs

7.1 Radiated Emission Test Setup

Below 1G

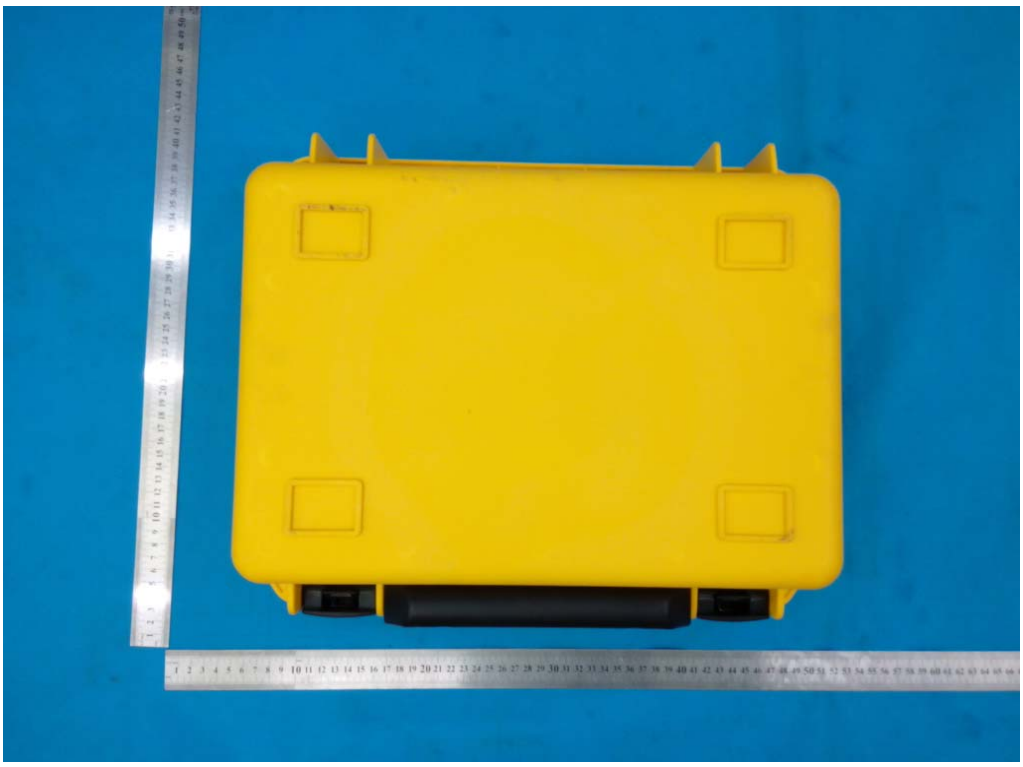


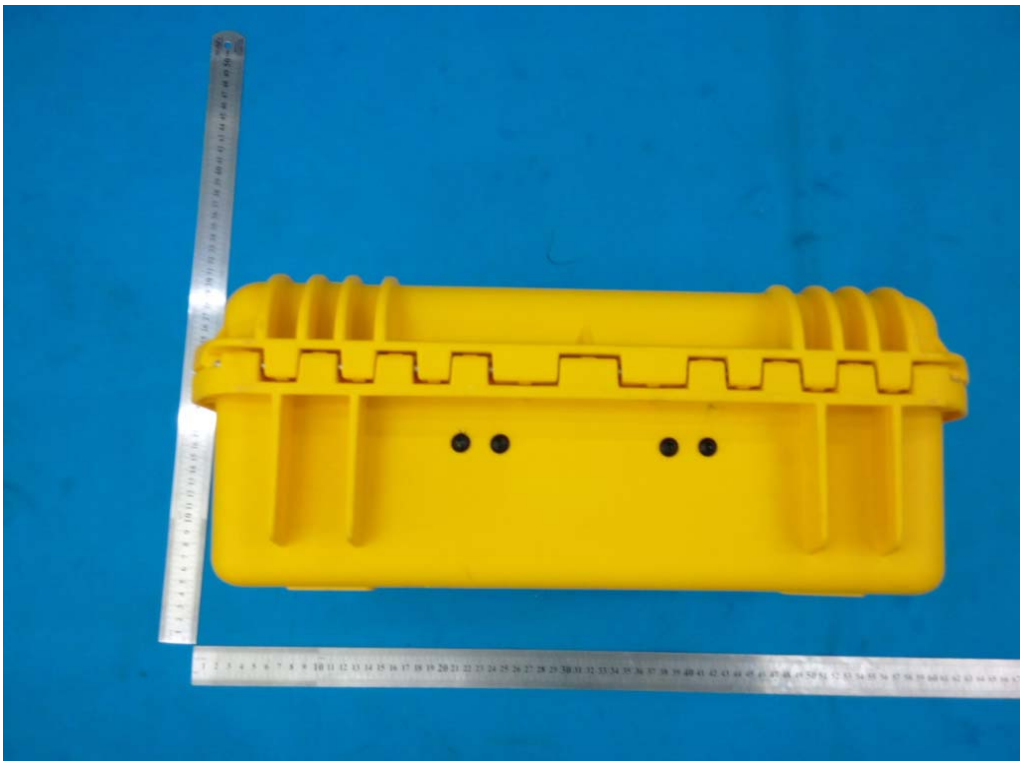
Above 1G



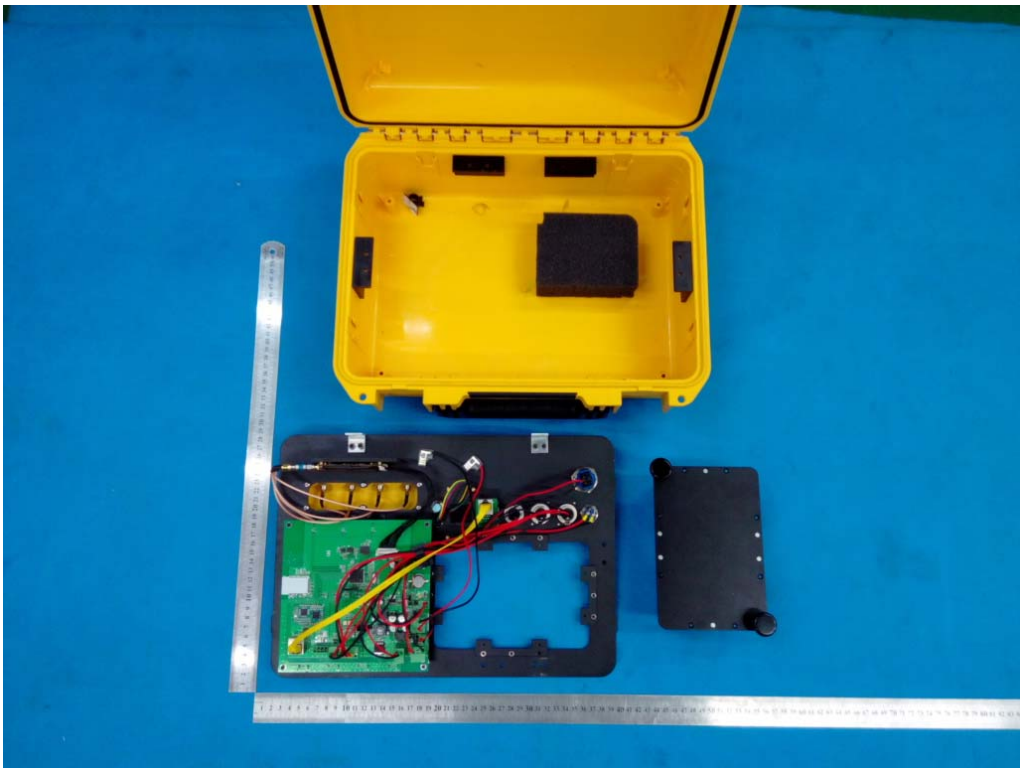
7.2 Conducted Emission Test Setup

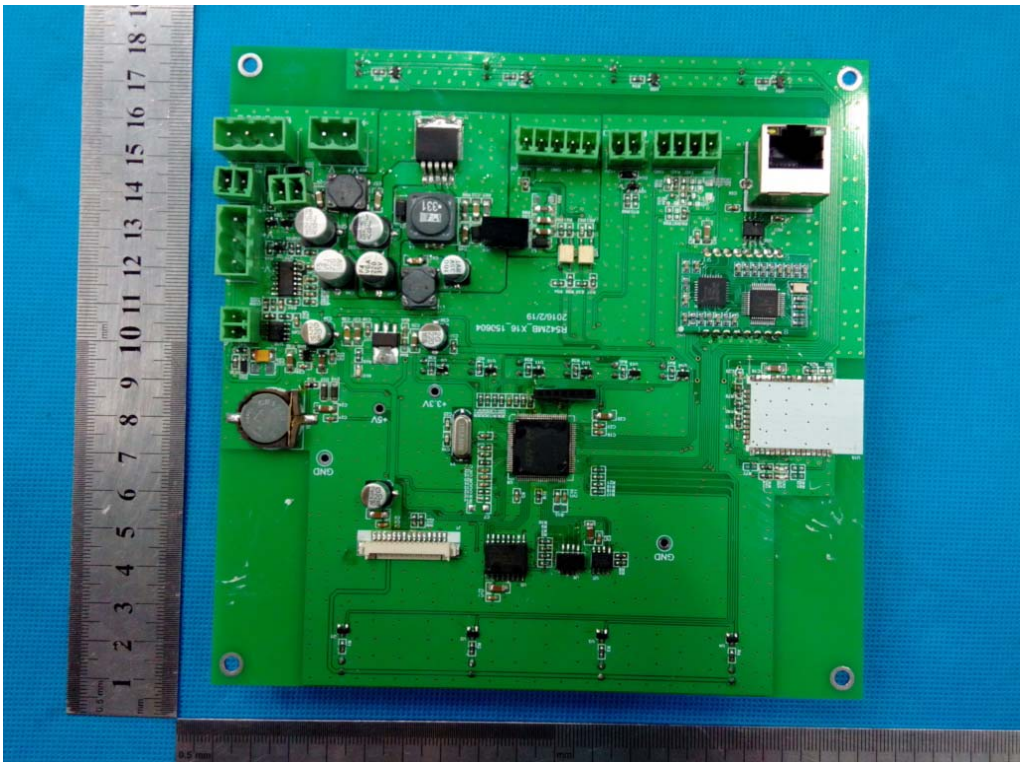
8 EUT Constructional Details

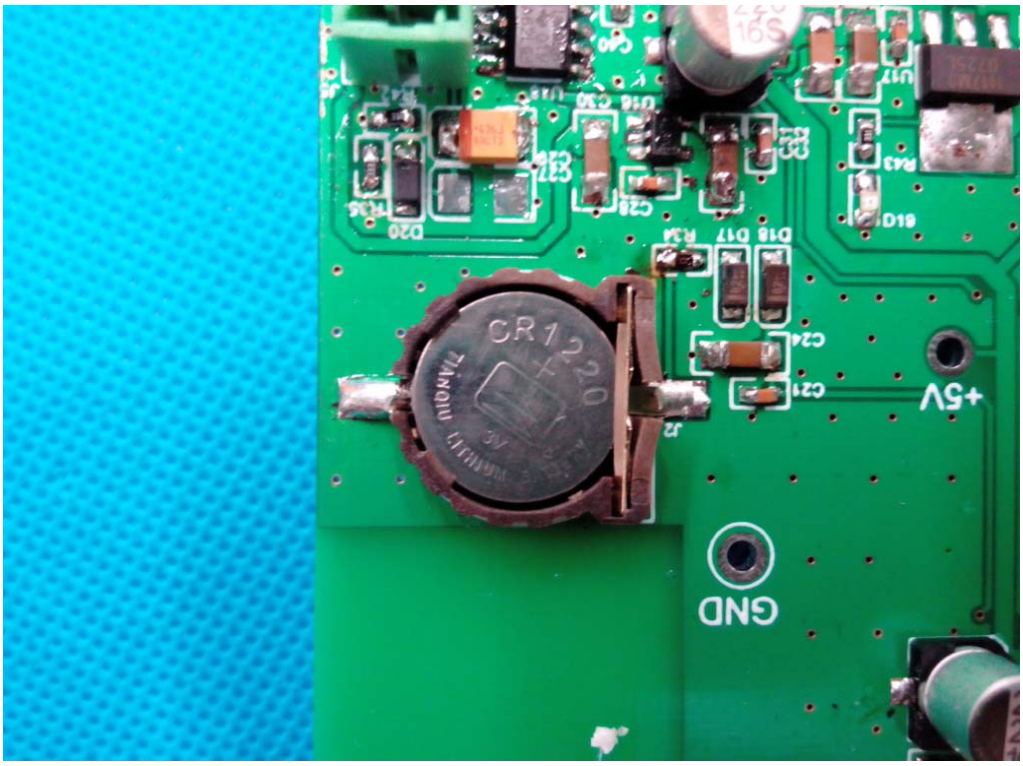


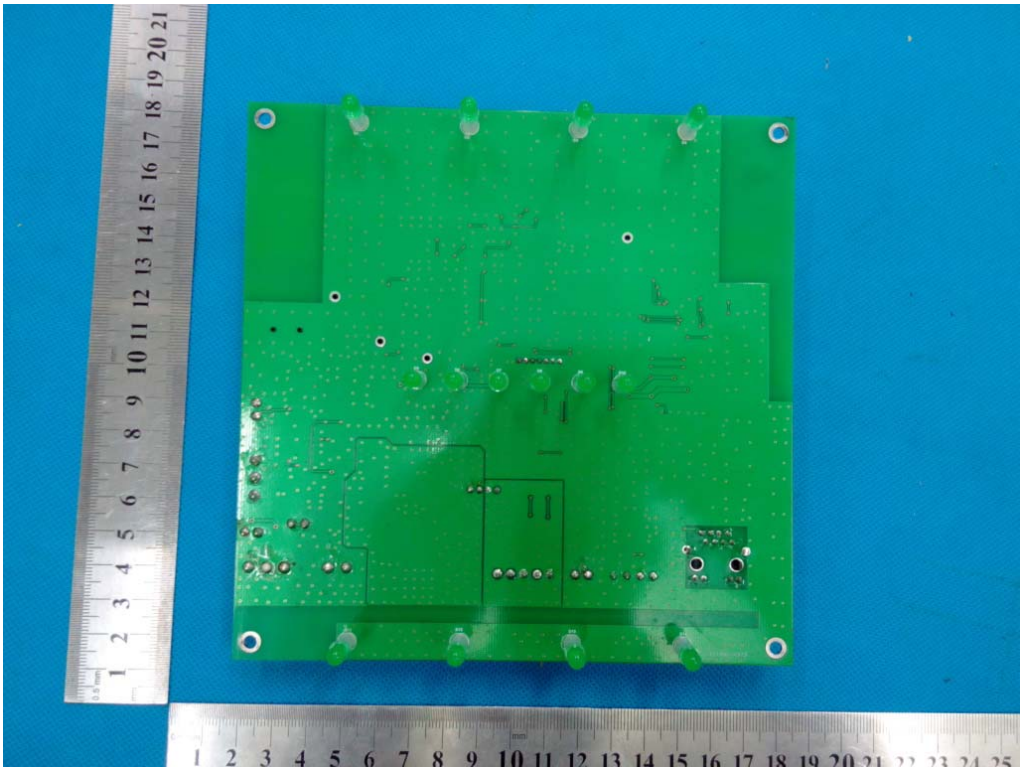


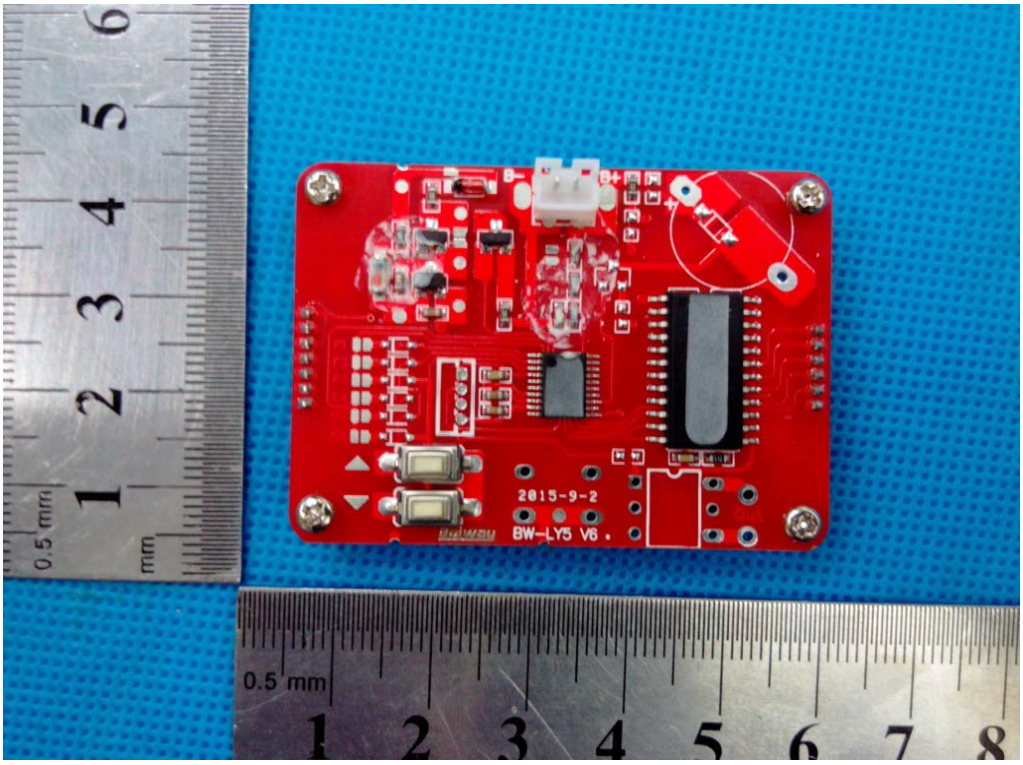
ACTIVE network
IPICO
Status/Tags read
Battery
ANT0
ANT1
ANT2
ANT3
SIM
Ethernet
Battery Charger
Buzzer Trigger
ON/OFF

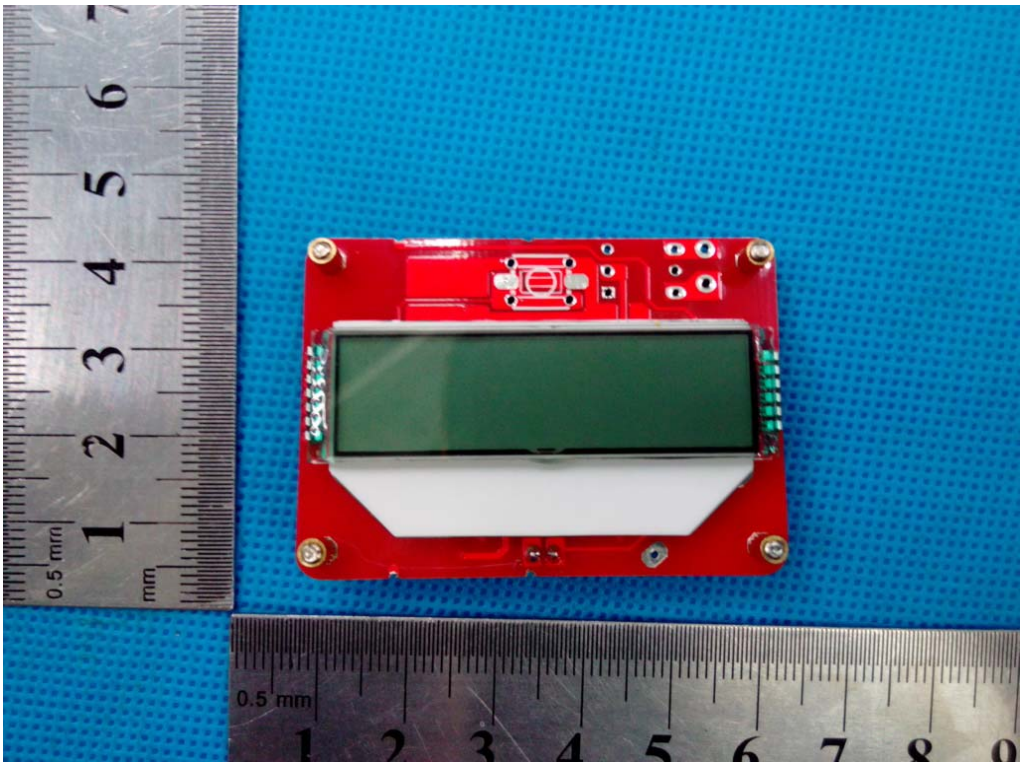


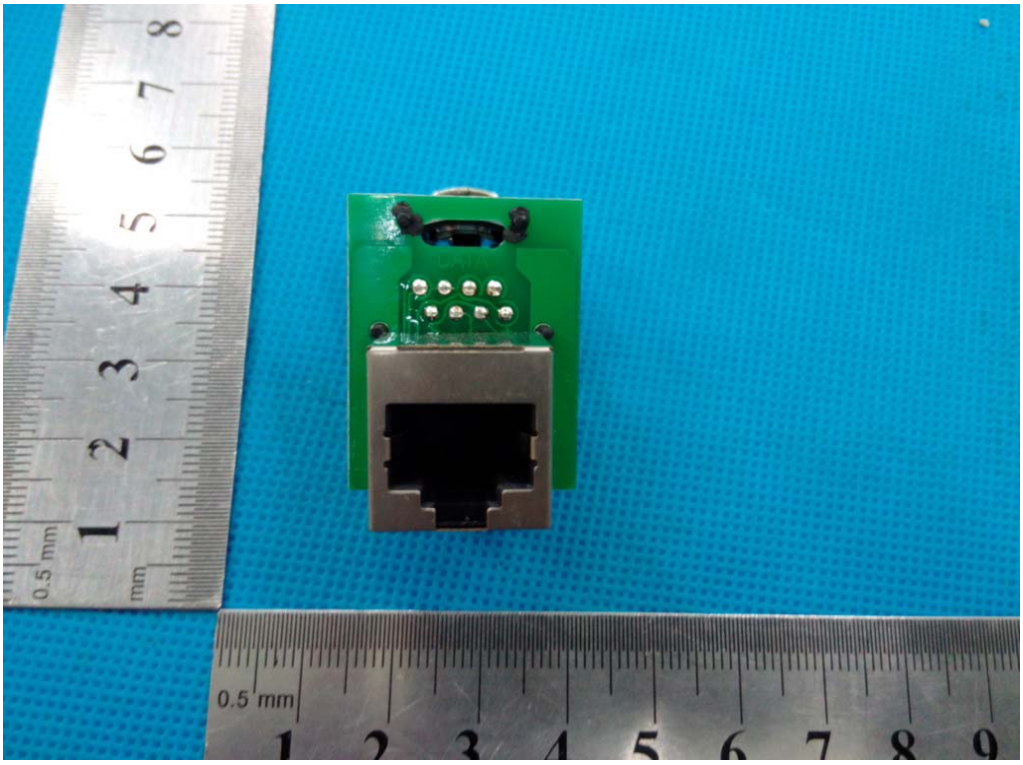


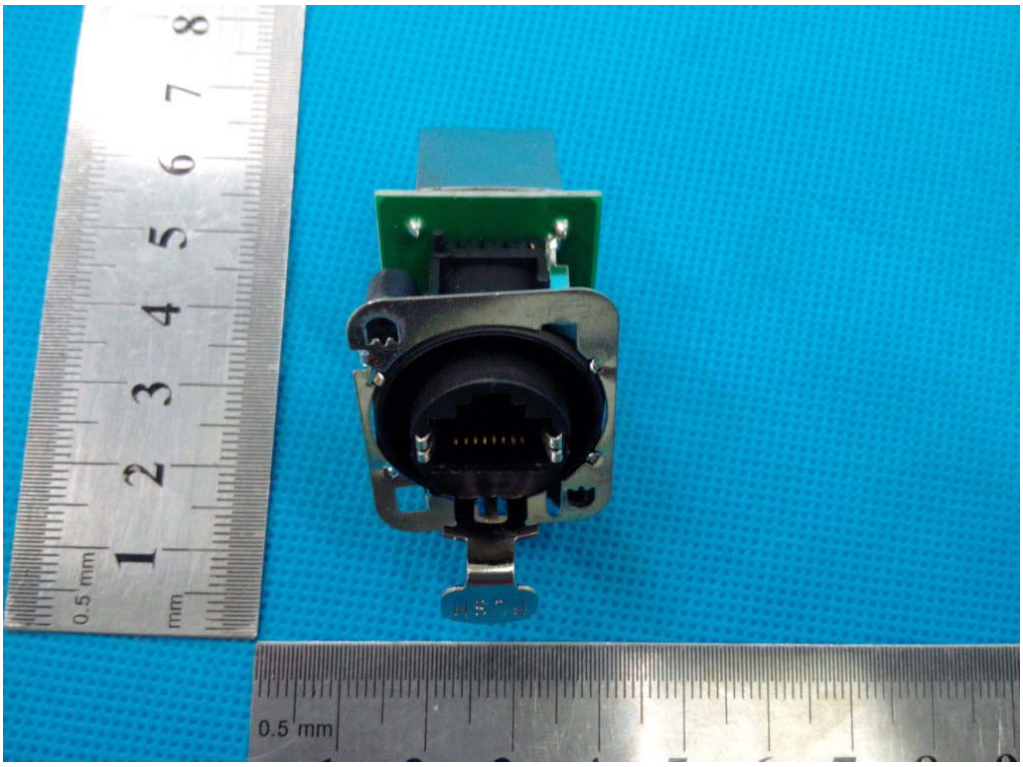

CR1220
GND
+5V

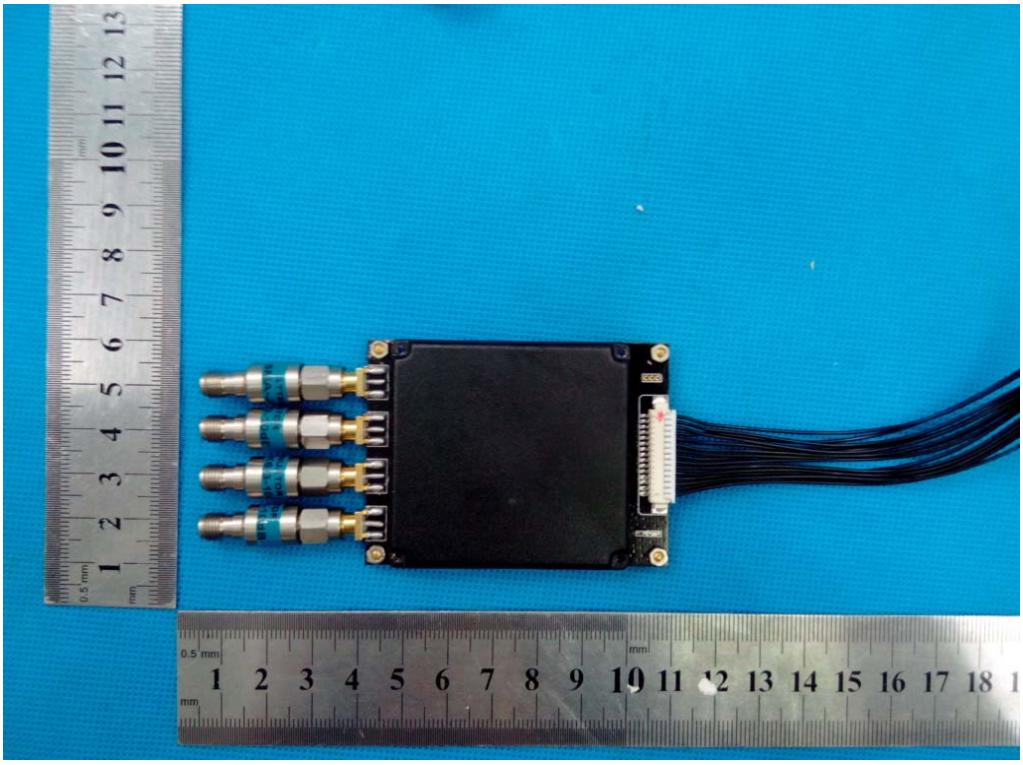


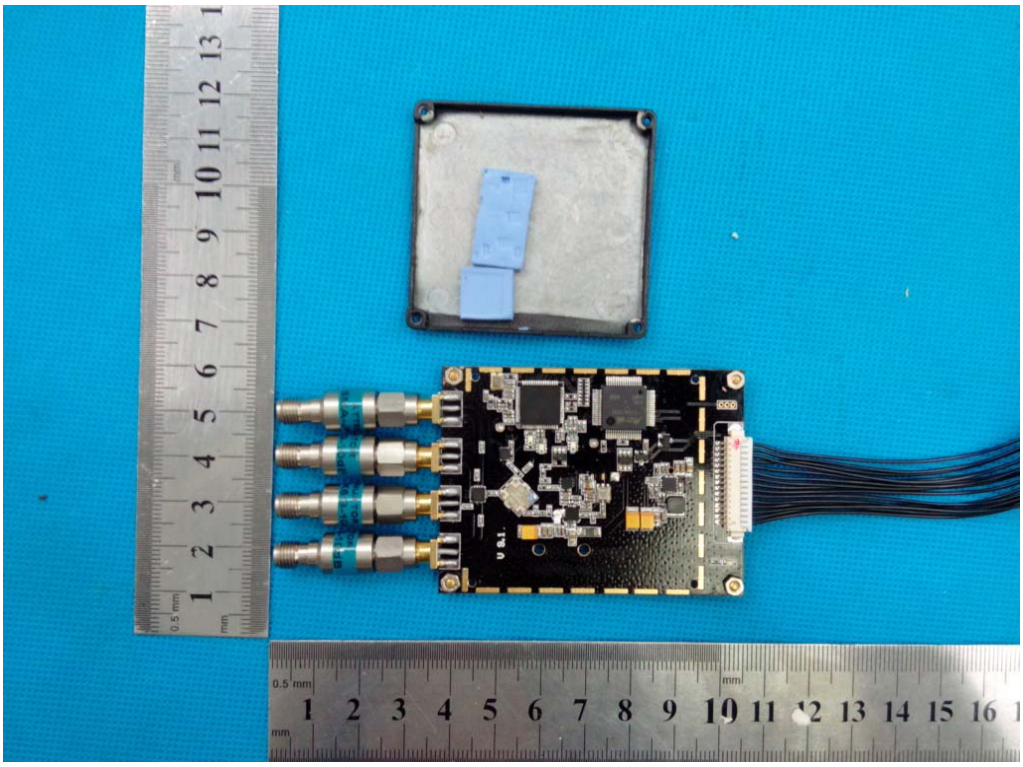

2015-9-2
BW-LY5 V6.
0.5 mm

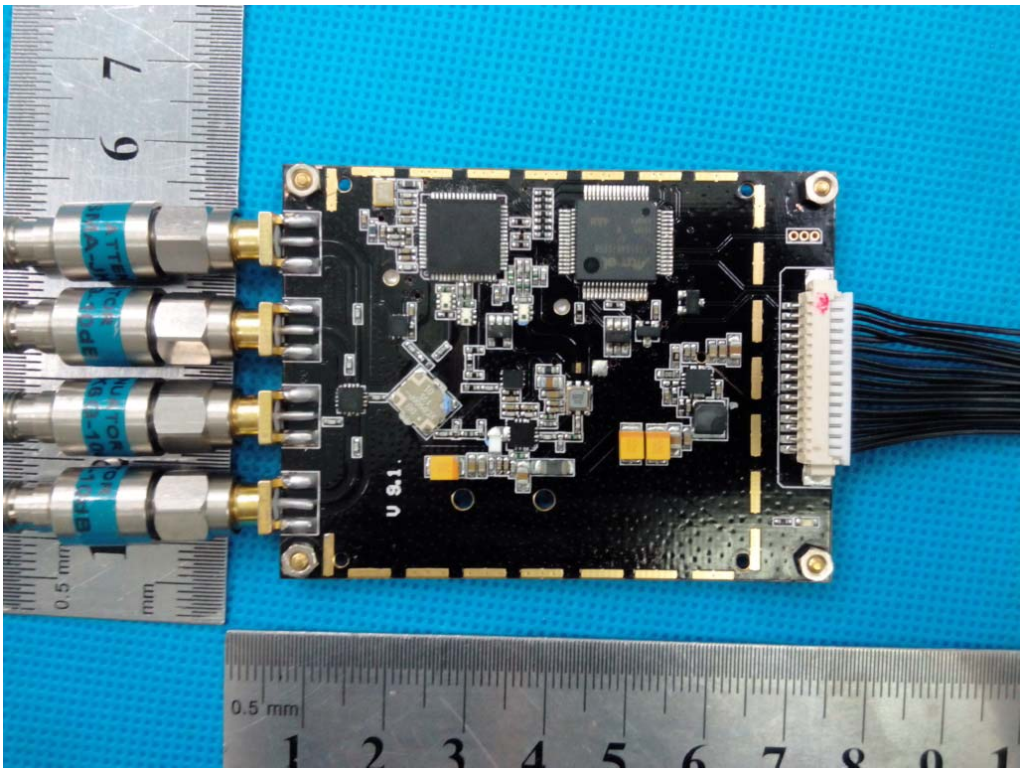

0.5 mm
0.5 mm

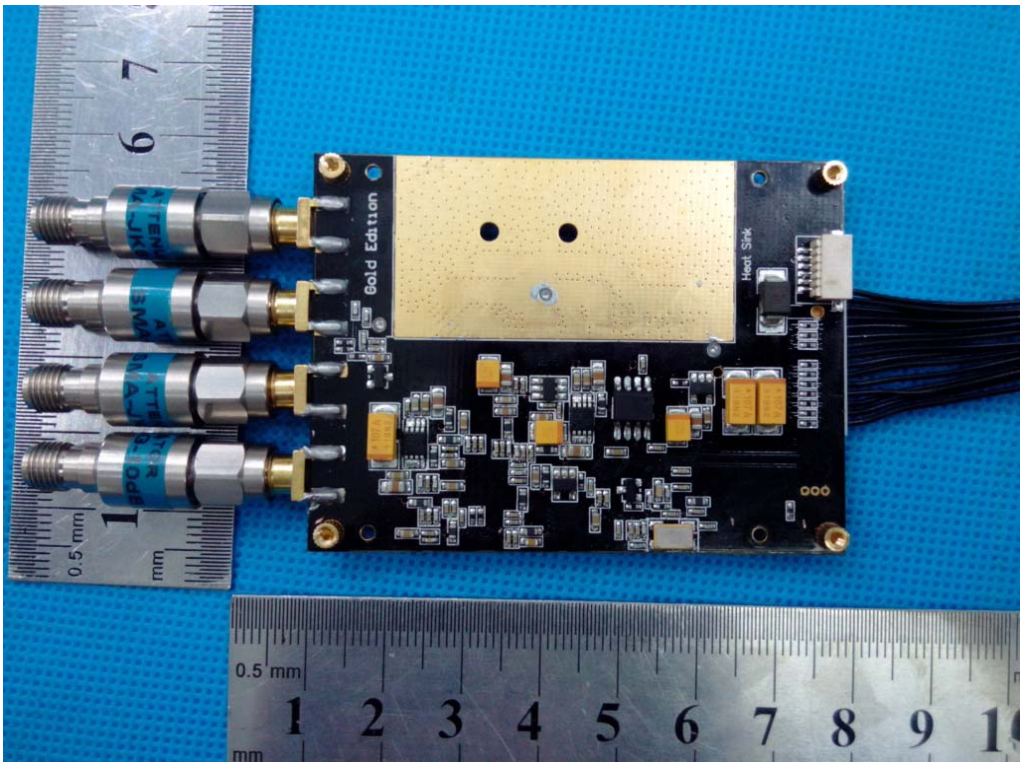

0.5 mm
0.5 mm



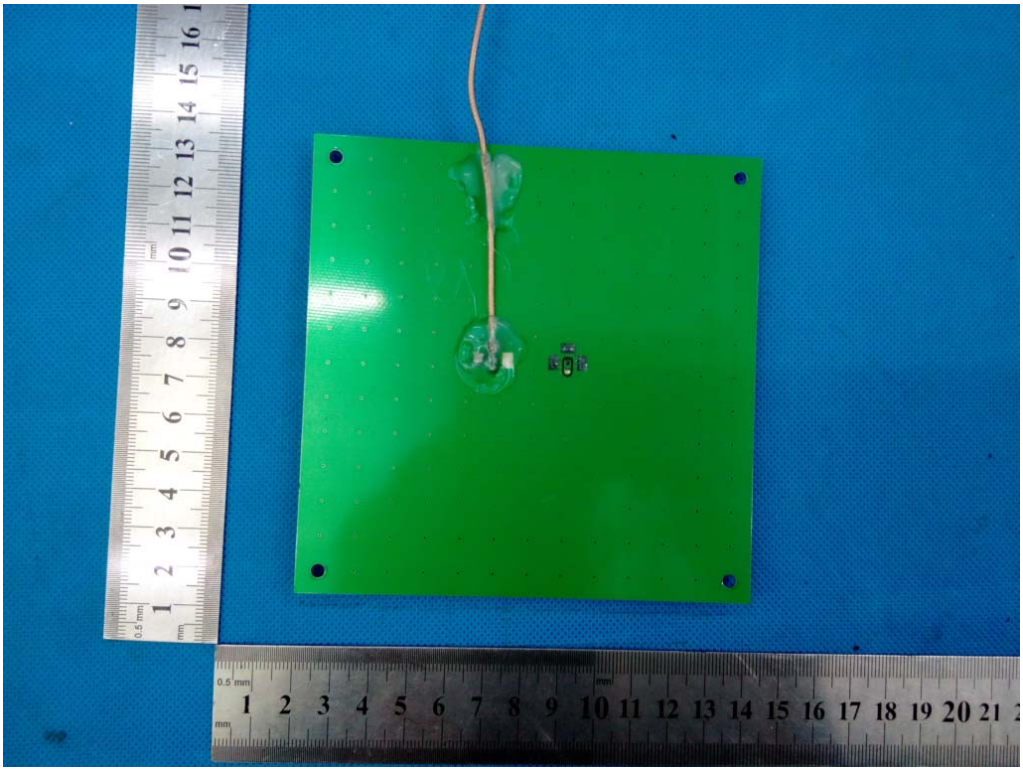


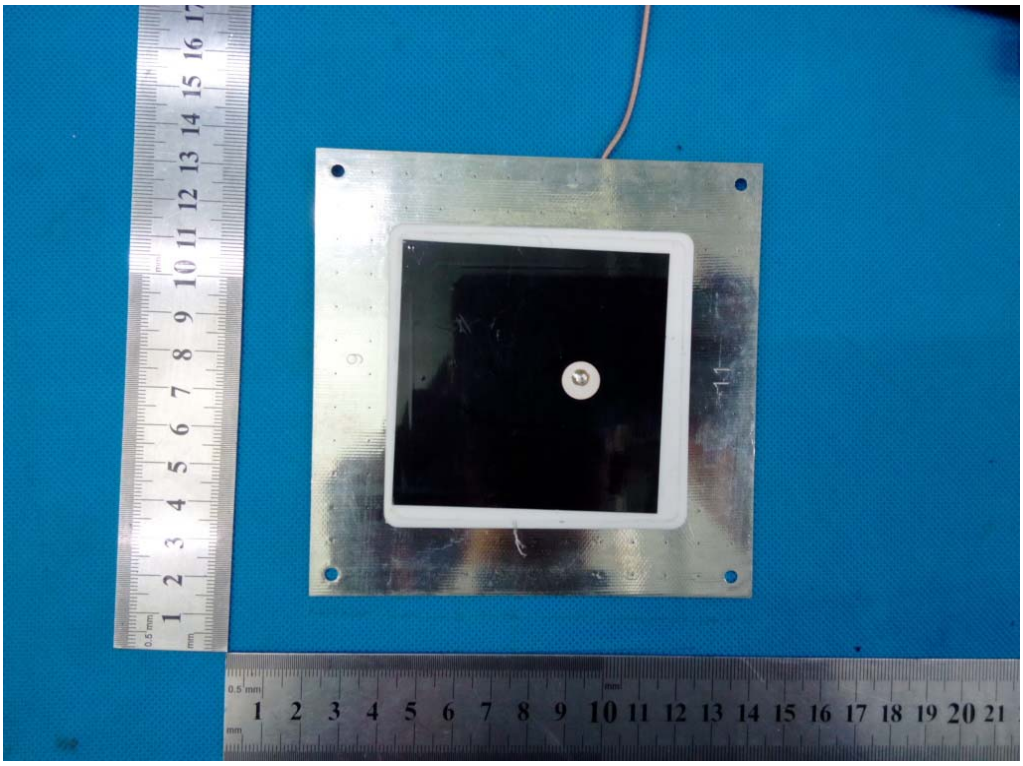





Gold Edition
Heat Sink
0.5 mm
mm

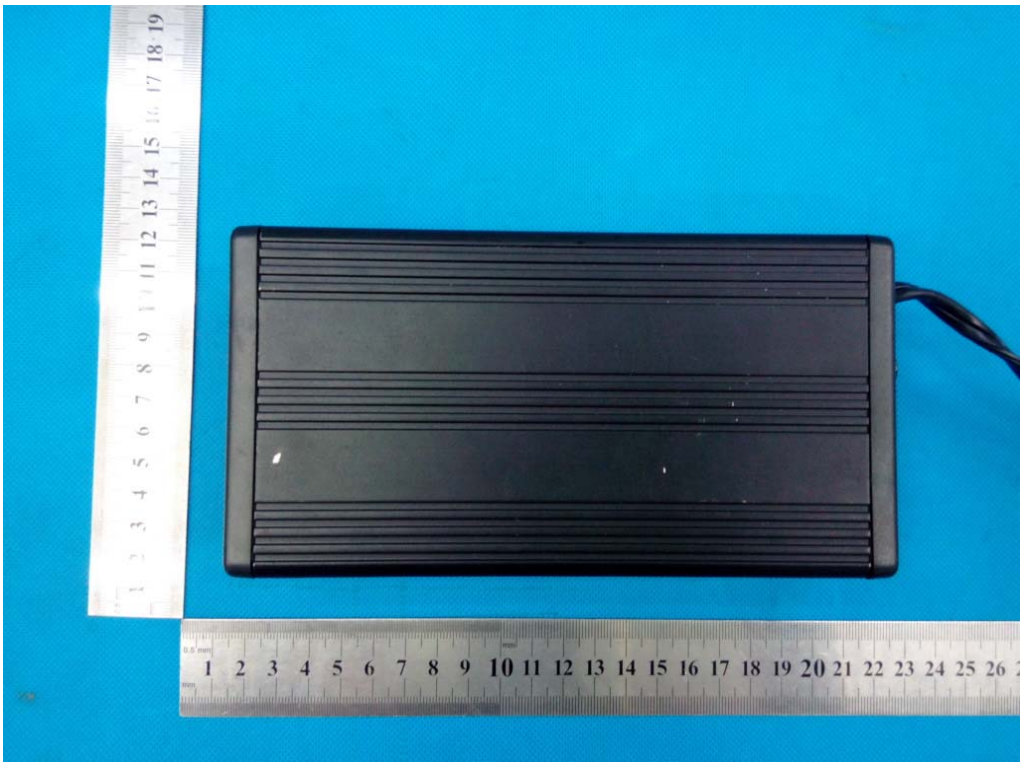
Panasonic
阀控式铅酸蓄电池
Valve Regulated Lead-Acid Battery
Model No. LC-RA127R2T1 (12V, 7.2Ah/20HR)
定电压充电电压值
Constant Voltage Charge Voltage regulation
循环用 Cycle use : 14.5V~14.9V (25°C)
(初期电流: 2.88A以下 Initial current: less than 2.88A)
浮流用 Standby use: 13.6V~13.8V (25°C)
注意 CAUTION
• 不可在密闭容器中充电
Do not charge in a gas tight container.
• 电池各端子间不可短路 Do not short the battery terminals.
• 不可放入火中等 Do not incinerate.
• 如身体不慎附着电解液(酸)的话, 请用水冲洗
Flush with water at once if contact is made with electrolyte (Acid).
• 不可对本蓄电池进行分解、改造
Do not attempt to disassemble the battery.
松下蓄电池(沈阳)有限公司
Panasonic Storage Battery (Shenyang) Co., Ltd.
原产地: 中国
Made in China
工业产品生产许可证编号:
XK06-006-00420
LEAD RETURN
RECYCLE
Pb

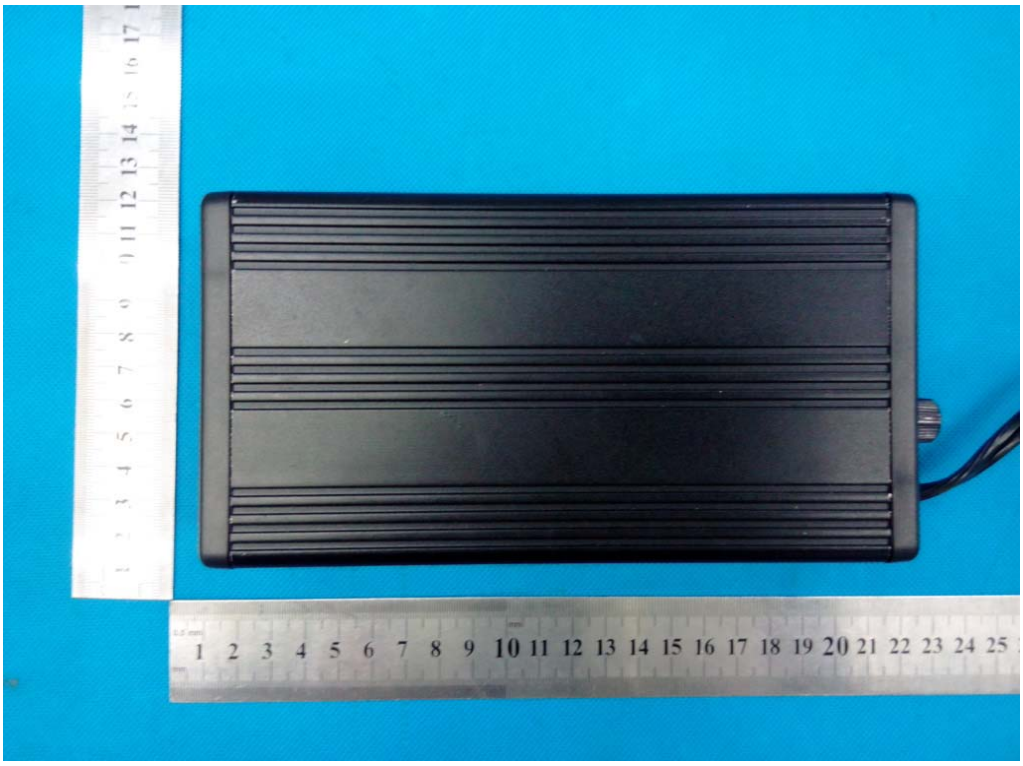




ANT0
ANT1
ANT2
ANT3

ANT0
ANT1
ANT2
ANT3





BATTERY CHARGER
CAUTION : • Charge only lead-acid type rechargeable batteries. Other type of batteries may burst causing personal injury and damaged.
• Explode gas! Prevention fire and electric spark.
• For indoors use only.
WARNING : • For continued protection against risk of fire replace only with same type and ratings of fuse.
MADE IN CHINA

MW
MEAN WELL
PA-120P-13C
MEAN WELL ENTERPRISES CO., LTD.
No. 28, Wuquan 3rd Rd., Wugu Dist.,
New Taipei City 24891, Taiwan (R.O.C.)
INPUT: 100-120VAC 3.0A
200-240VAC 1.5A
50/60Hz
OUTPUT: 13.8V 7.2A
LED INDICATION
MW02
RED : CHARGING
GREEN : BATTERY FULL
GREEN FLASH : BATTERY DISCONNECT
OUTPUT FUSE F15A/125V
S/N:
INPUT FUSE F4A/250V

****End of report****