

FCC TEST REPORT

Product : GNSS Receiver
Trade mark : N/A
Model/Type reference : T300
Serial Number : N/A
Ratings : DC 5-27V
FCC ID : 2ACHBT300
Report Number : EESZG04250005
Date : June 13, 2014
Regulations : See below

Test Standards	Results
☒ 47 CFR FCC Part 15 Subpart B:2013	PASS

Prepared for:
ComNav Technology Ltd.
Building E, No.50 Alley 2080 Lianhua Road 201103 Shanghai-China

Prepared by:
Centre Testing International (Shenzhen) Corporation
Hongwei Industrial Zone, 70 Area, Bao'an District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested by: Kevin Tang Reviewed by: Chris Chen
Approved by: Louisa Lu Date: June 13, 2014



Check No.: 1843459333

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	3
2. TEST SUMMARY.....	3
3. MEASUREMENT UNCERTAINTY.....	3
4. PRODUCT INFORMATION AND TEST SETUP.....	4
5. FACILITIES AND ACCREDITATIONS.....	4
5.1 TEST FACILITY.....	4
5.2 TEST EQUIPMENT LIST.....	4
6. SYSTEM TEST CONFIGURATION.....	5
6.1. JUSTIFICATION.....	5
7. CONDUCTED EMISSION TEST.....	6
7.1. LIMITS.....	6
7.2. BLOCK DIAGRAM OF TEST SETUP.....	6
7.3. PROCEDURE OF CONDUCTED EMISSION TEST.....	6
7.4. WORST CASE TEST GRAPHS AND TEST DATA.....	7
8. RADIATED EMISSION TEST.....	9
8.1. LIMITS.....	9
8.2. BLOCK DIAGRAM OF TEST SETUP.....	9
8.3. PROCEDURE OF RADIATED EMISSION TEST.....	10
8.4. WORST CASE TEST GRAPHS AND TEST DATA.....	11
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP.....	15
APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT.....	17
APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT.....	18

(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: ComNav Technology Ltd.
Building E, No.50 Alley 2080 Lianhua Road 201103
Shanghai-China

Manufacturer: ComNav Technology Ltd.
Building E, No.50 Alley 2080 Lianhua Road 201103
Shanghai-China

Equipment Authorization: Certification

FCC ID: 2ACHBT300

Product: GNSS Receiver

Trade mark: N/A

Model/Type reference: T300

Serial Number: N/A

Report Number: EESZG04250005

Sample Received Date: Apr. 25, 2014

Sample tested Date: Apr. 25, 2014 to June 13, 2014

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Standard	Test Item	Test
FCC 15.107	Conducted Emission	Yes
FCC 15.109	Radiated Emission	Yes

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test item	Value (dB)
Conducted disturbance	3.0
Radiated disturbance (30MHz to 1GHz)	4.9

4. PRODUCT INFORMATION AND TEST SETUP

4.1. PRODUCT INFORMATION

Ratings: DC 5-27V

4.2. TEST SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between Product and support equipment.

4.3. SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	Data Cable	Remark
1.	Notebook	lenovo	Vostro 3400	GYQTVP1	N/A	FCC DOC
2.	Mouse	L.Selectron	M004	02284699	Un-shielded 1.2M	FCC DOC
3.	Printer	HP	1020	CNCK766629	Un-shielded 1.2M	FCC DOC

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5. FACILITIES AND ACCREDITATIONS

5.1 TEST FACILITY

All test facilities used to collect the test data are located at Hongwei Industrial Zone, 70 Area, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.

5.2 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipments used at CTI for testing.

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

Equipment used during the tests:

Shielding Room No. 1 - Conducted Emission Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	R&S	ESCI	100009	07/19/2014
Spectrum Analyzer	Agilent	E4443A	MY45300910	01/15/2015
LISN	R&S	ENV216	100098	07/19/2014

3M Semi-anechoic Chamber (1)- Radiated disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/12/2016
Spectrum Analyzer	Agilent	E4443A	MY45300910	01/15/2015
Receiver	R&S	ESCI	100435	07/19/2014
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	618	06/25/2014
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/19/2014
Microwave Preamplifier	Agilent	8449B	3008A02425	03/19/2015

6. SYSTEM TEST CONFIGURATION

6.1. JUSTIFICATION

The system was configured for testing in a typical fashion (as a customer would normally use it), The Product was placed on a turn table, which enabled the engineer to maximize emissions through its placement as outlined in ANSI C63.4 (2009).

For maximizing emissions, the Product was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The rear of unit shall be flushed with the rear of the table.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

7. CONDUCTED EMISSION TEST

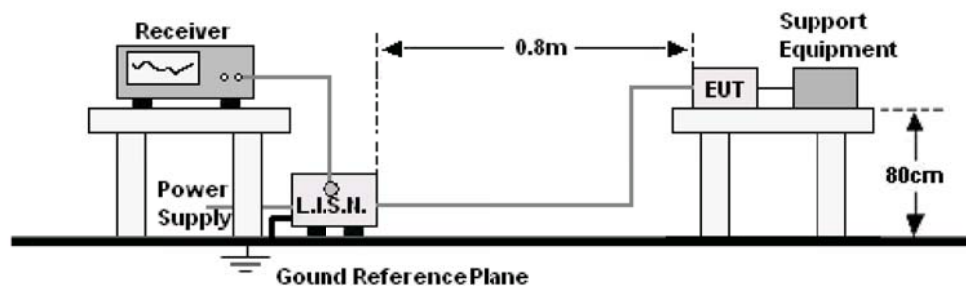
7.1. LIMITS

Limits for Class B digital devices

Frequency range (MHz)	Limits 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 lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

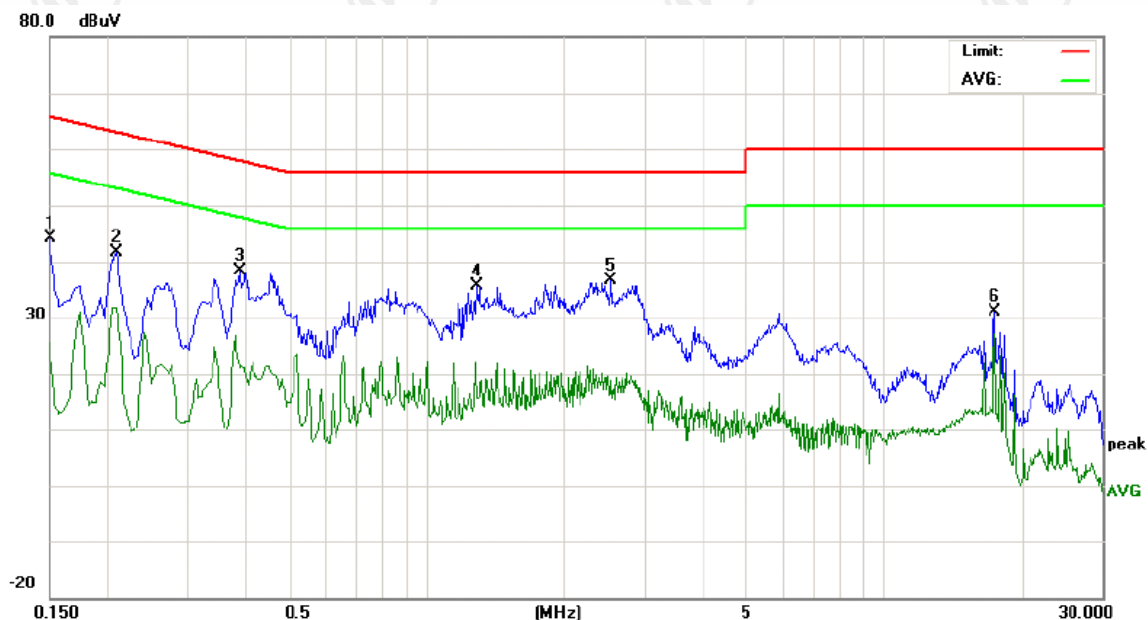
7.2. BLOCK DIAGRAM OF TEST SETUP



7.3. PROCEDURE OF CONDUCTED EMISSION TEST

- The Product was placed on a nonconductive table above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

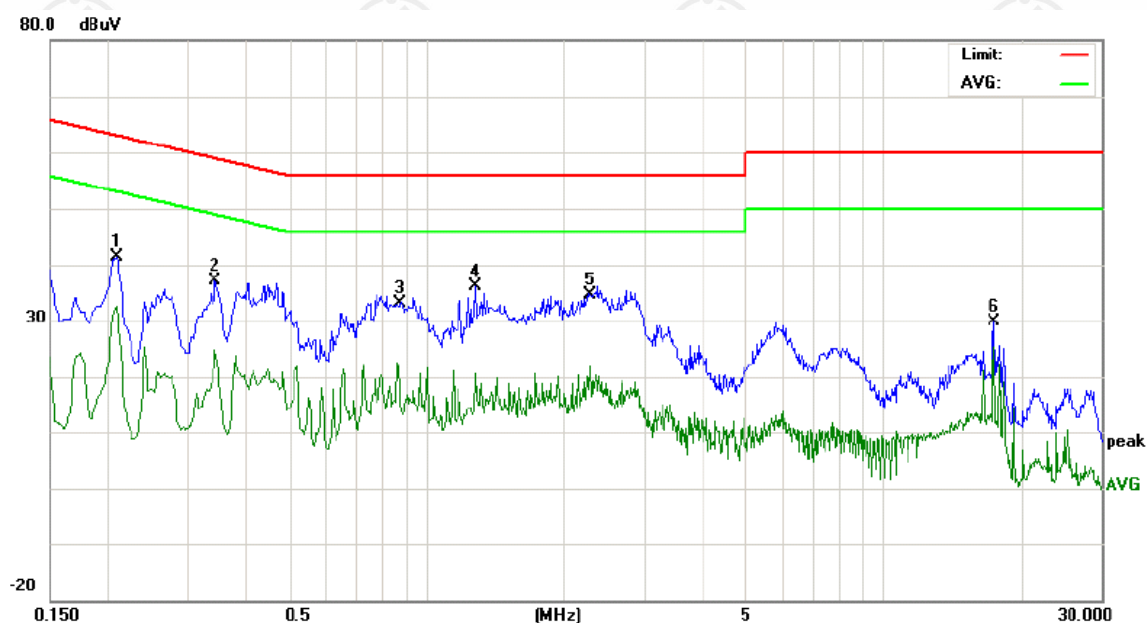
7.4. WORST CASE TEST GRAPHS AND TEST DATA



Site site #1
Limit: FCC Part 15 B CE (QP)
EUT: GNSS Receiver
M/N: T300
Mode: Data exchange
Note:

Phase: **L**
Power: AC 120V/60Hz
Temperature: 24
Humidity: 53 %

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1500	34.25	31.40	15.90	9.75	44.00	41.15	25.65	65.99	55.99	-24.84	-30.34	P	
2	0.2099	31.78	27.60	22.07	9.80	41.58	37.40	31.87	63.21	53.21	-25.81	-21.34	P	
3	0.3899	28.49	25.20	11.41	9.80	38.29	35.00	21.21	58.06	48.06	-23.06	-26.85	P	
4	1.2900	25.89	21.93	5.94	9.83	35.72	31.76	15.77	56.00	46.00	-24.24	-30.23	P	
5	2.5299	26.60	23.70	8.98	9.92	36.52	33.62	18.90	56.00	46.00	-22.38	-27.10	P	
6	17.4859	20.92	18.40	16.81	10.25	31.17	28.65	27.06	60.00	50.00	-31.35	-22.94	P	



Site site #1

Phase: **N**

Temperature: 24

Limit: FCC Part 15 B CE (QP)

Power: AC 120V/60Hz

Humidity: 53 %

EUT: GNSS Receiver

M/N: T300

Mode: Data exchange

Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2100	31.59	27.63	22.85	9.80	41.39	37.43	32.65	63.20	53.20	-25.77	-20.55	P	
2	0.3460	27.22	23.40	15.03	9.80	37.02	33.20	24.83	59.06	49.06	-25.86	-24.23	P	
3	0.8620	23.07	20.10	12.84	9.80	32.87	29.90	22.64	56.00	46.00	-26.10	-23.36	P	
4	1.2860	26.19	22.96	10.56	9.83	36.02	32.79	20.39	56.00	46.00	-23.21	-25.61	P	
5	2.2860	24.64	21.07	11.95	9.91	34.55	30.98	21.86	56.00	46.00	-25.02	-24.14	P	
6	17.4900	19.68	17.24	15.16	10.25	29.93	27.49	25.41	60.00	50.00	-32.51	-24.59	P	

8. RADIATED EMISSION TEST

8.1. LIMITS

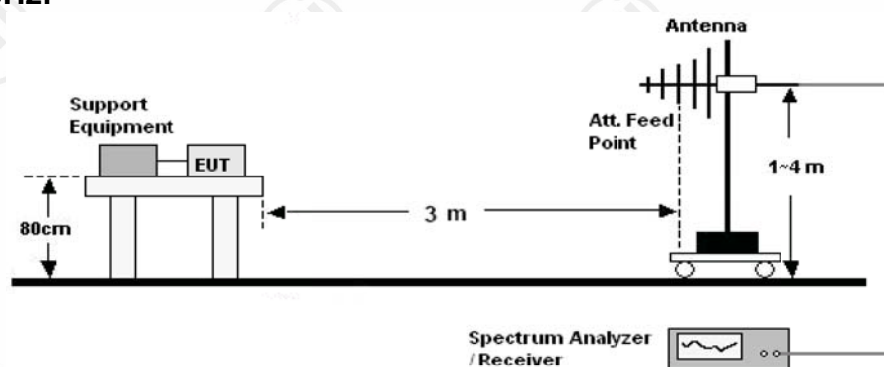
Limits for Class B digital devices

Frequency (MHz)	limits at 3m dB(μ V/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

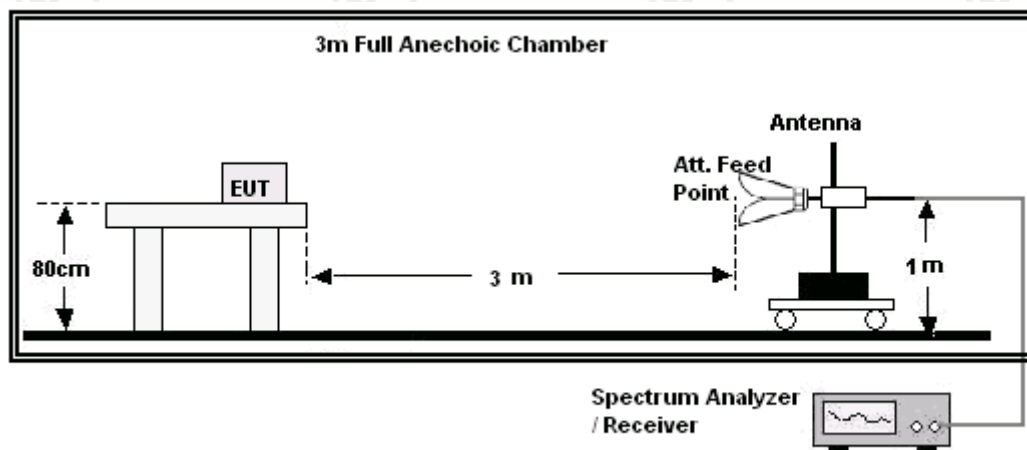
- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

8.2. BLOCK DIAGRAM OF TEST SETUP

30MHz ~ 1GHz:



Above 1GHz:



8.3. PROCEDURE OF RADIATED EMISSION TEST

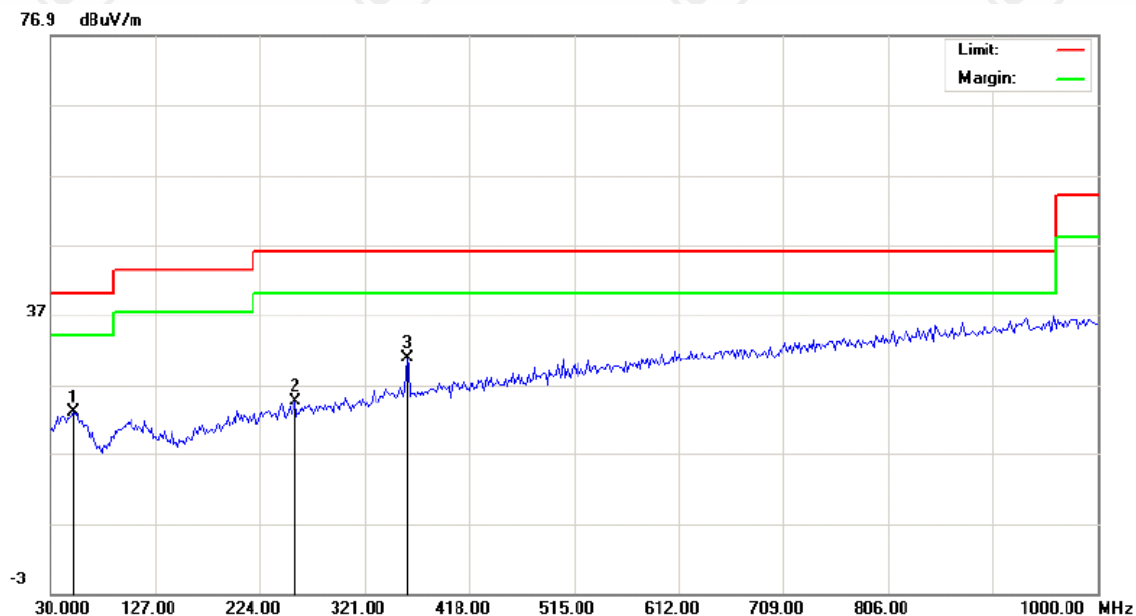
30MHz ~ 1GHz:

- a. The Product was placed on the non-conductive turntable 0.8m above the ground at a chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

- a. The Product was placed on the non-conductive turntable 0.8m above the ground at a full anechoic chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

8.4. WORST CASE TEST GRAPHS AND TEST DATA



Site site #1

Polarization: **Horizontal**

Temperature: 24

Limit: FCC PART15 B Radiation

Power: AC 120V/60Hz

Humidity: 58 %

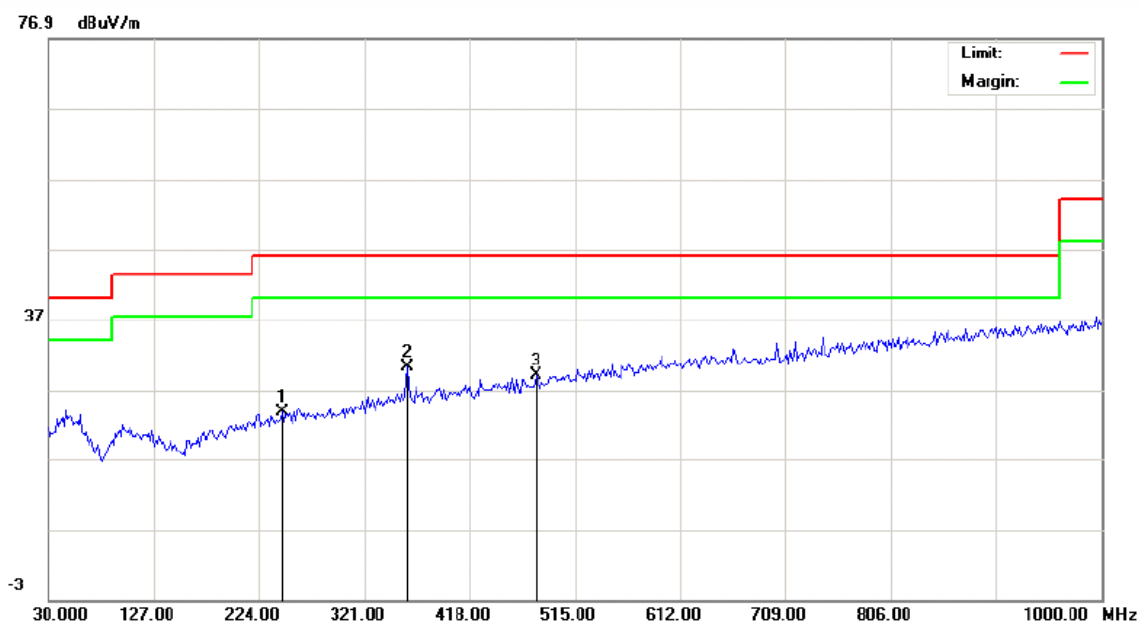
EUT: GNSS Receiver

M/N: T300

Mode: Data exchange

Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB		Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG			peak	QP	AVG						
1	51.0167	7.55	5.17		15.45		23.00	20.62		40.00		-19.38		P	
2	256.3333	9.41	6.40		15.11		24.52	21.51		46.00		-24.49		P	
3	359.8000	12.93	8.30		17.84		30.77	26.14		46.00		-19.86		P	



Site site #1

Polarization: **Vertical**

Temperature: 24

Limit: FCC PART15 B Radiation

Power: AC 120V/60Hz

Humidity: 58 %

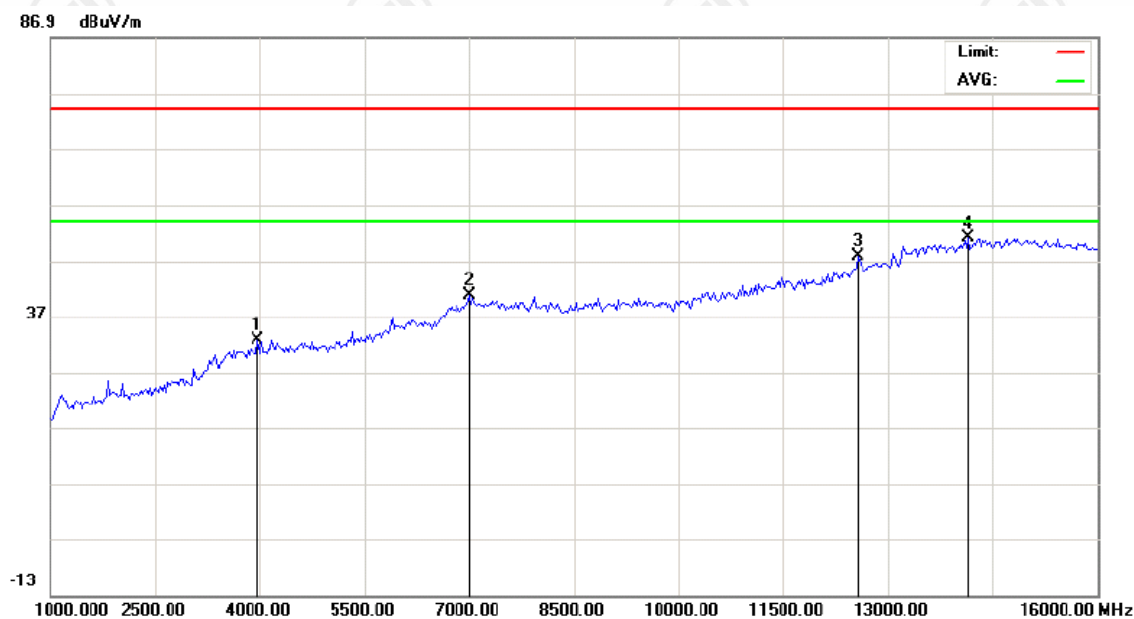
EUT: GNSS Receiver

M/N: T300

Mode: Data exchange

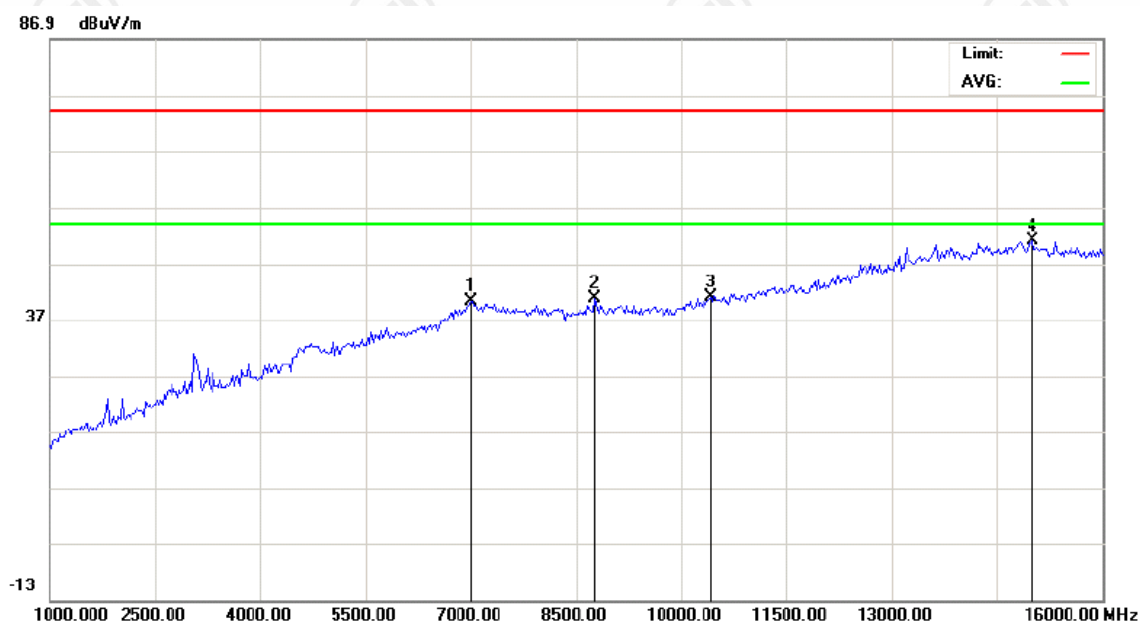
Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	245.0167	8.85	7.20		14.89	23.74	22.09		46.00		-23.91		P	
2	359.8000	12.42	9.48		17.84	30.26	27.32		46.00		-18.68		P	
3	479.4333	9.24	8.10		19.81	29.05	27.91		46.00		-18.09		P	



Site site #1 Polarization: **Horizontal** Temperature: 24
 Limit: FCC PART15B 3M ABOVE 1G PEAK Power: AC 120V, 60Hz Humidity: 58 %
 EUT: GNSS Receiver
 M/N: T300
 Mode: Data exchange
 Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	3975.000	26.00			6.78	32.78			74.00	54.00	-41.22		P	
2	7000.000	28.29			12.37	40.66			74.00	54.00	-33.34		P	
3	12575.00	29.71			18.18	47.89			74.00	54.00	-26.11		P	
4	14150.00	30.72			20.22	50.94			74.00	54.00	-23.06		P	



Site site #1 Polarization: **Vertical** Temperature: 24
 Limit: FCC PART15B 3M ABOVE 1G PEAK Power: AC 120V, 60Hz Humidity: 58 %
 EUT: GNSS Receiver
 M/N: T300
 Mode: Data exchange
 Note:

No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	7000.000	27.84			12.37	40.21			74.00	54.00	-33.79		P	
2	8775.000	27.70			13.06	40.76			74.00	54.00	-33.24		P	
3	10425.00	26.39			14.59	40.98			74.00	54.00	-33.02		P	
4	15000.00	29.71			21.31	51.02			74.00	54.00	-22.98		P	

Remark:

1. The highest frequency of the internal sources of the EUT is 1.6 GHz, so the measurement shall be made up to 16 GHz.
2. The above tables show that the frequencies peak data are all below the average limit, so the average data of these frequencies are deems to fulfill the average limits and not reported.

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



CONDUCTED EMISSION TEST SETUP

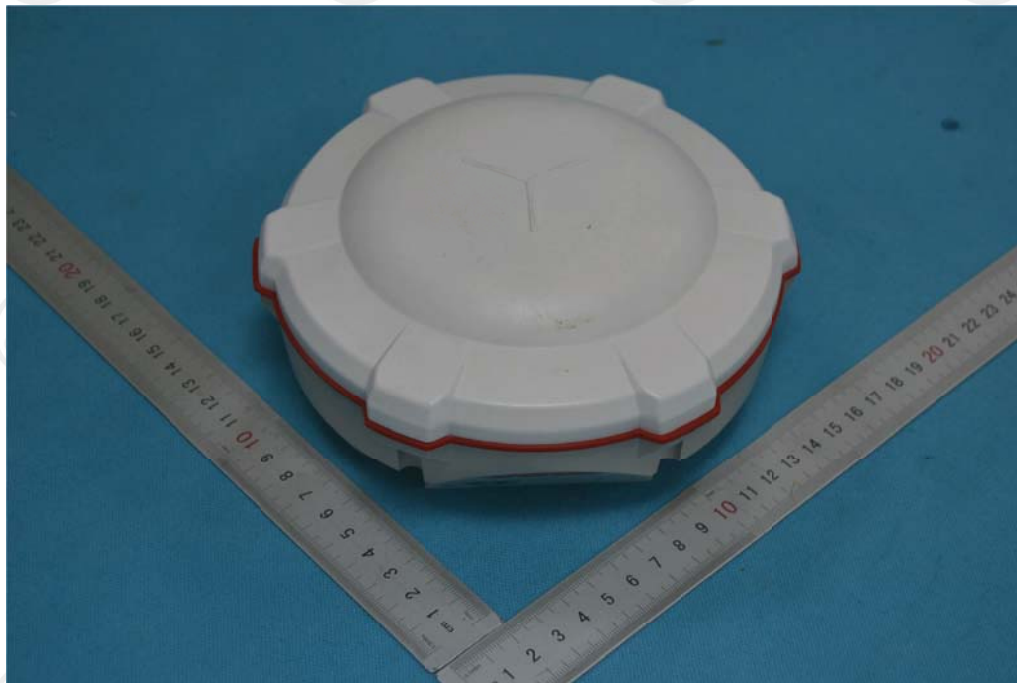


RADIATED EMISSION TEST SETUP (30MHz ~ 1GHz)



RADIATED EMISSION TEST SETUP (Above 1GHz)

APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT



External View of Product-1



External View of Product-2

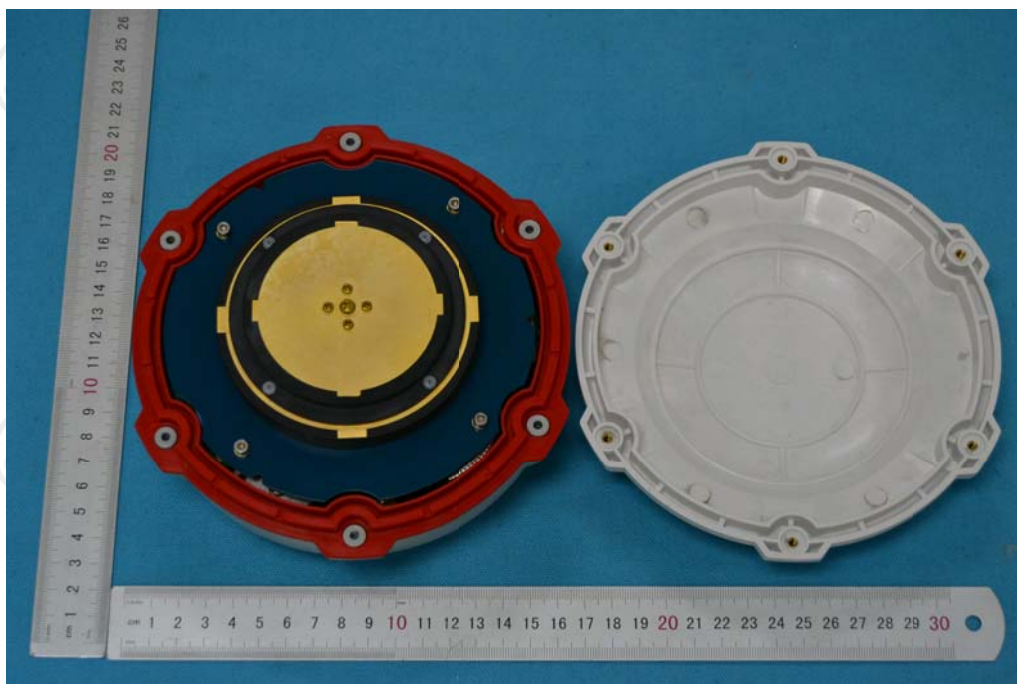
APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT



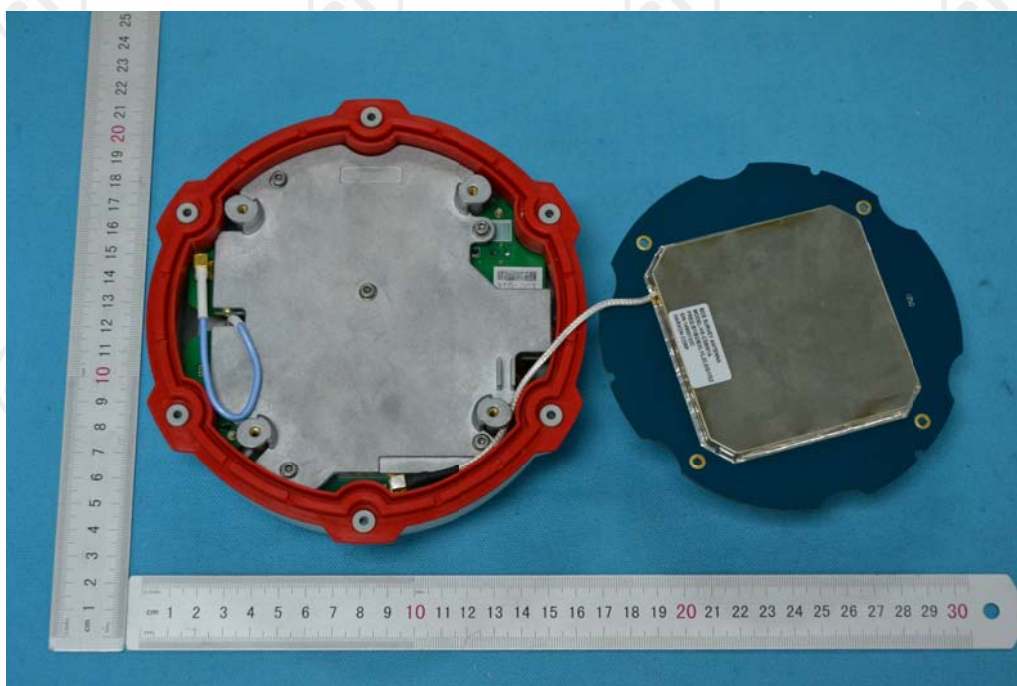
Internal View of Product-1



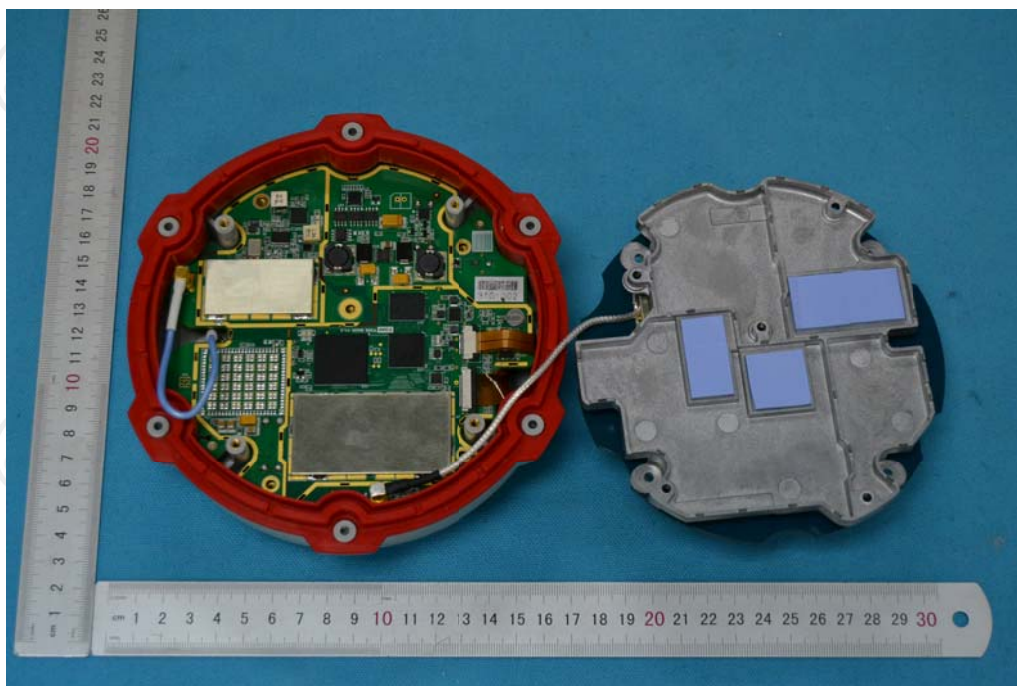
Internal View of Product-2



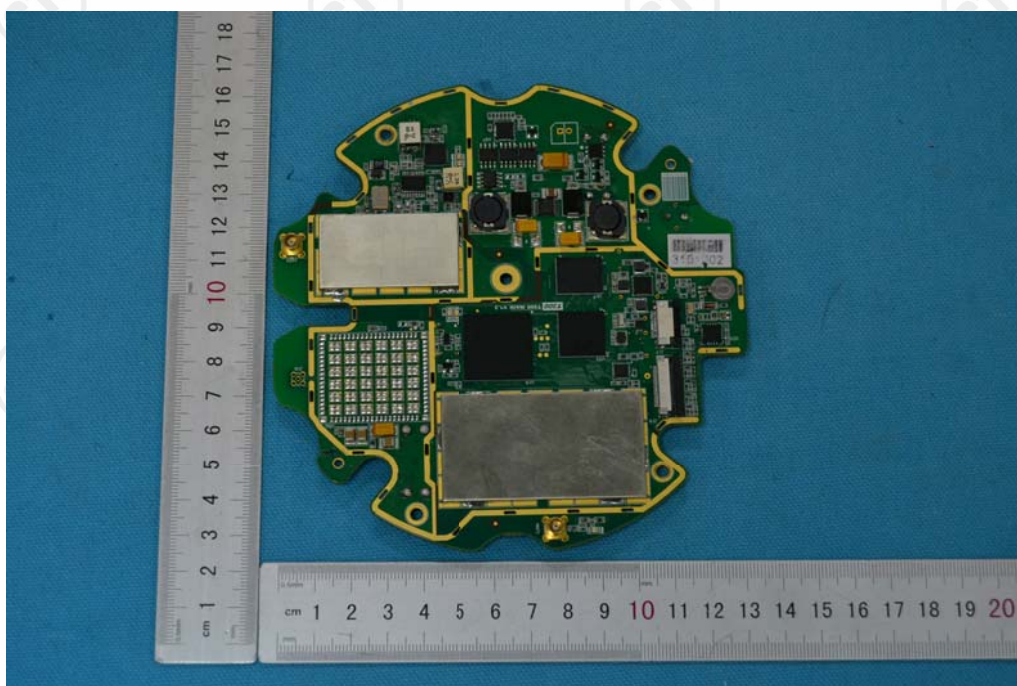
Internal View of Product-3



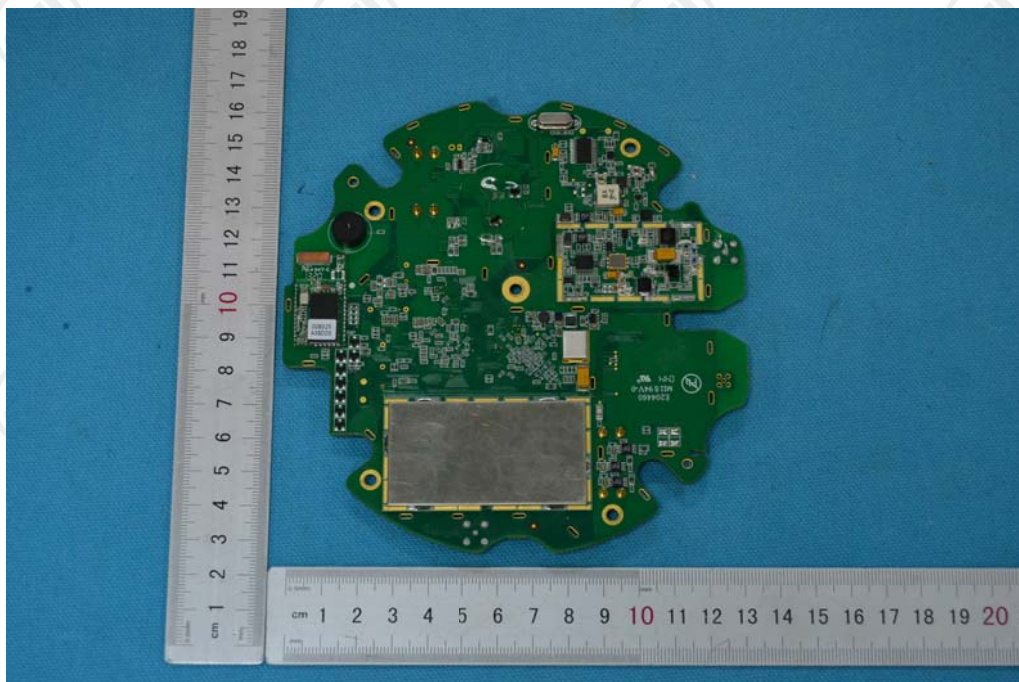
Internal View of Product-4



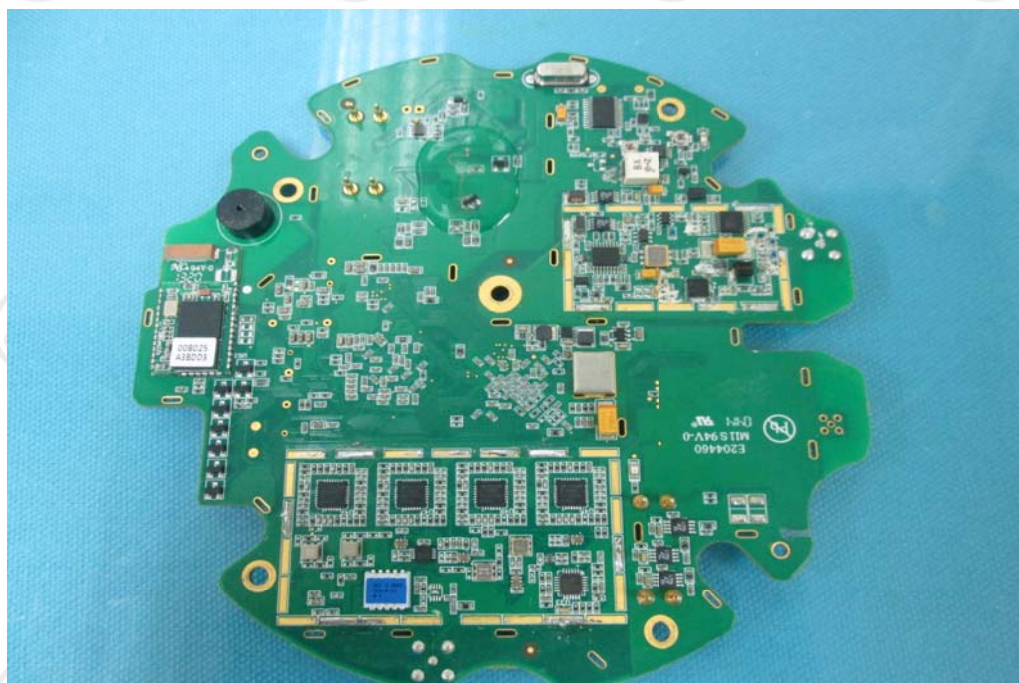
Internal View of Product-5



Internal View of Product-6



Internal View of Product-7



Internal View of Product-8



Internal View of Product-9

***** End of Report *****

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