

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 |
|---|---------|
| <input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart B:2013 | PASS |

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

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Approved by: Louisa Lu Date: June 13, 2014



Check No.: 1843459333

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(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

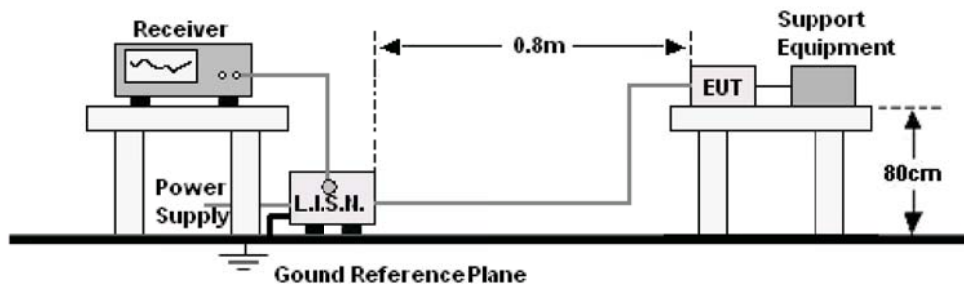
Limits for Class B digital devices

| 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.

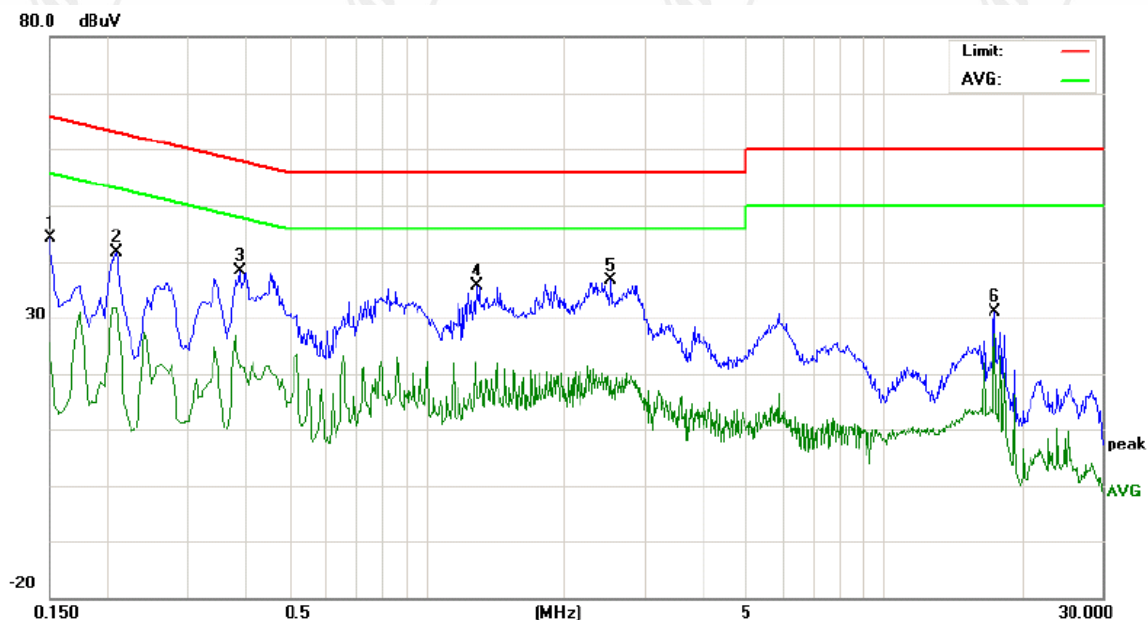
7.2. BLOCK DIAGRAM OF TEST SETUP



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.

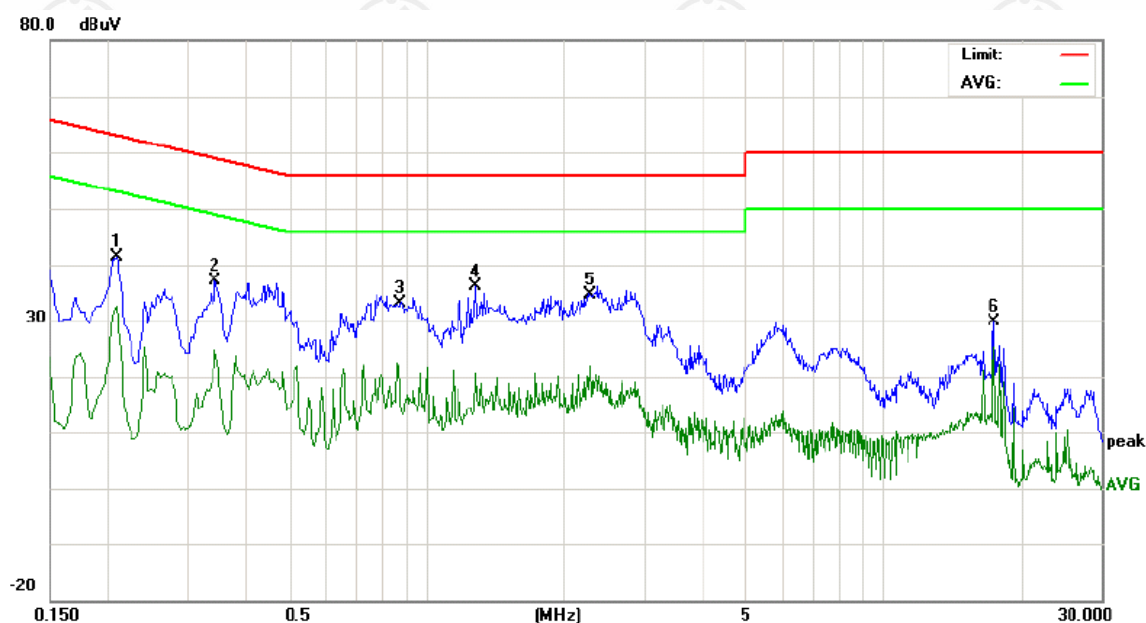
7.4. WORST CASE TEST GRAPHS AND TEST DATA



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

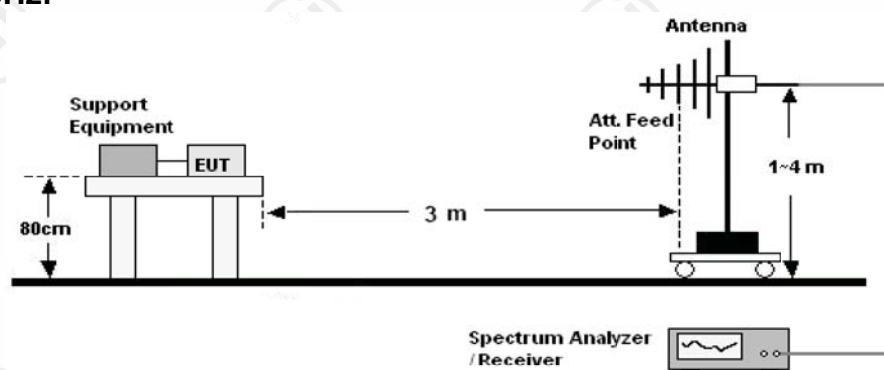
Limits for Class B digital devices

| 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 |

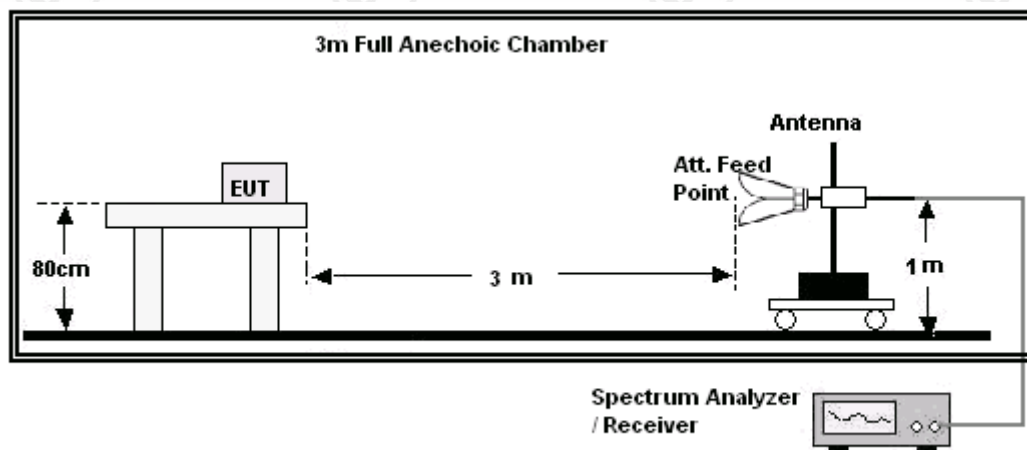
- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average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

8.2. BLOCK DIAGRAM OF TEST SETUP

30MHz ~ 1GHz:



Above 1GHz:



8.3. PROCEDURE OF RADIATED EMISSION TEST

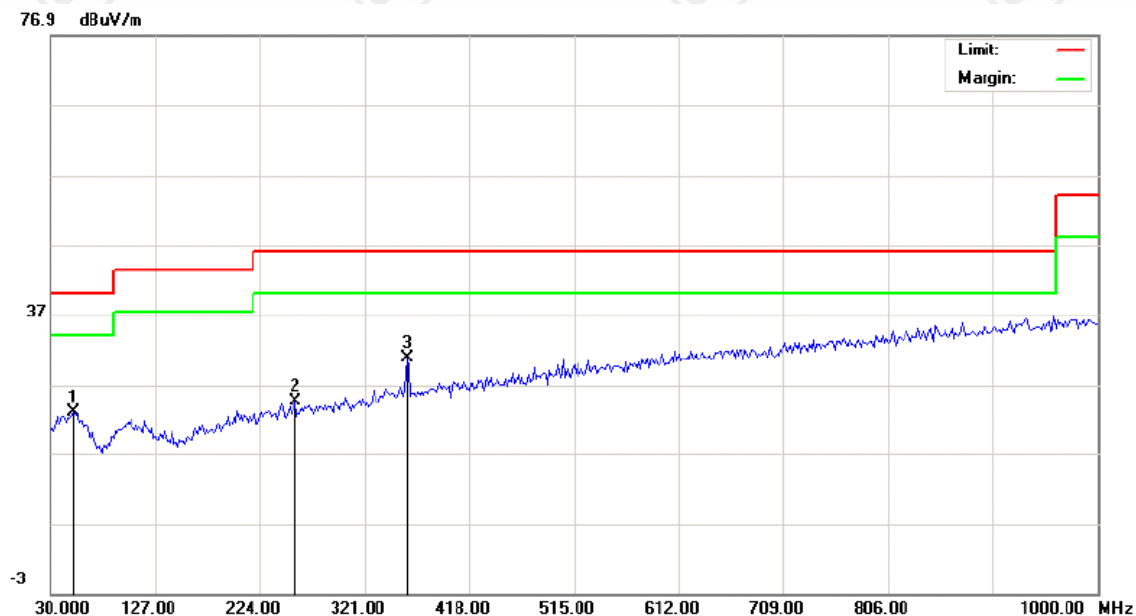
30MHz ~ 1GHz:

- 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 %

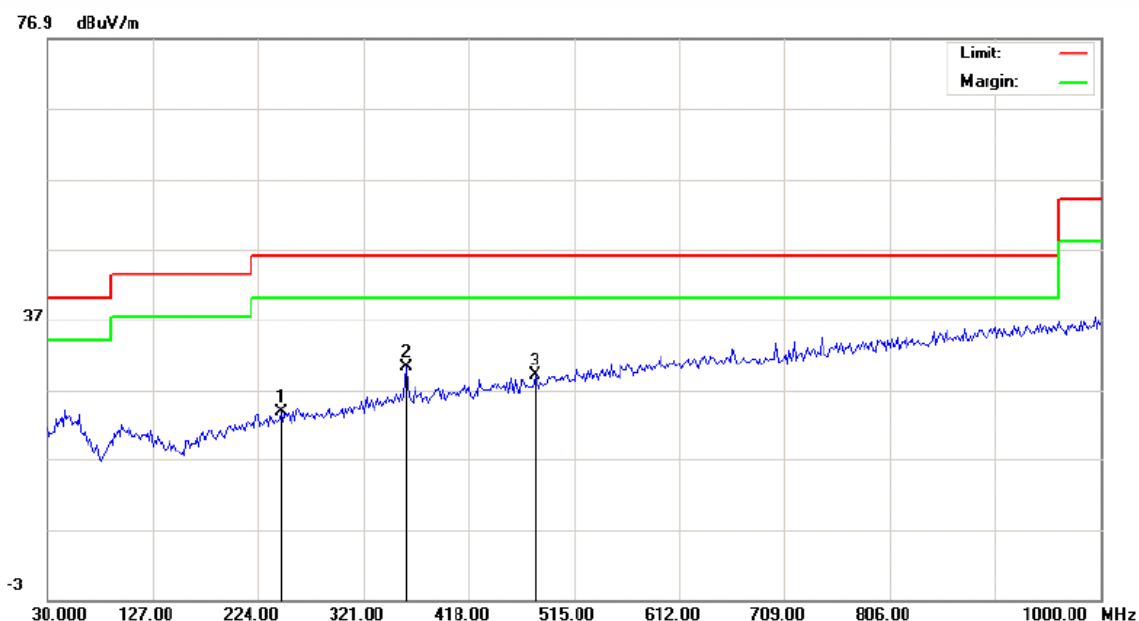
EUT: GNSS Receiver

M/N: T300

Mode: Data exchange

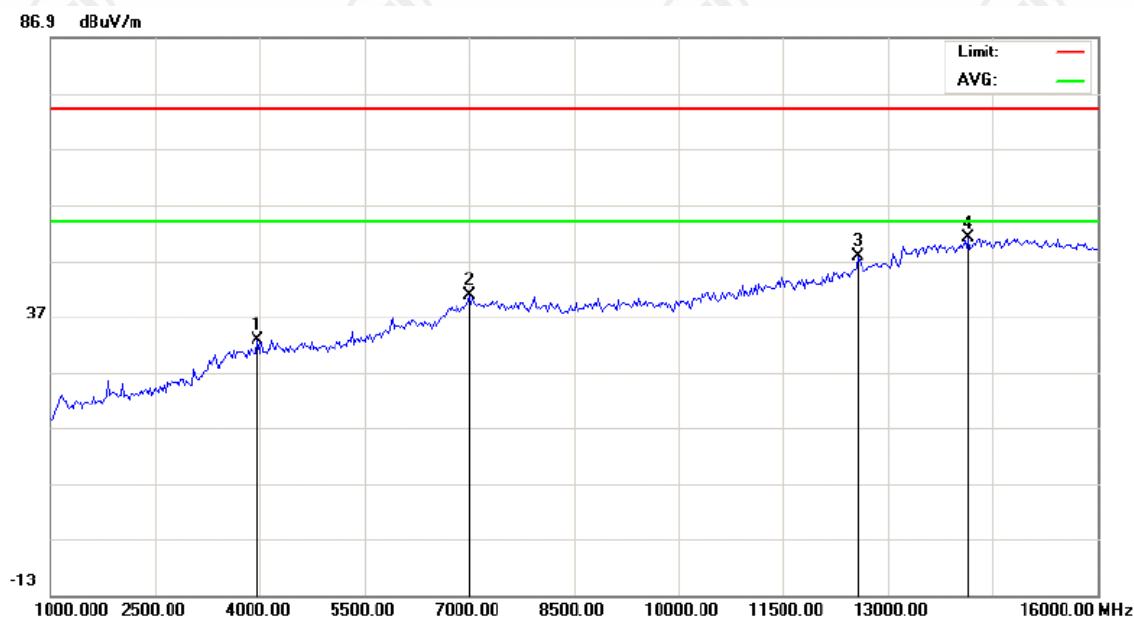
Note:

| 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 | | | 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 | |



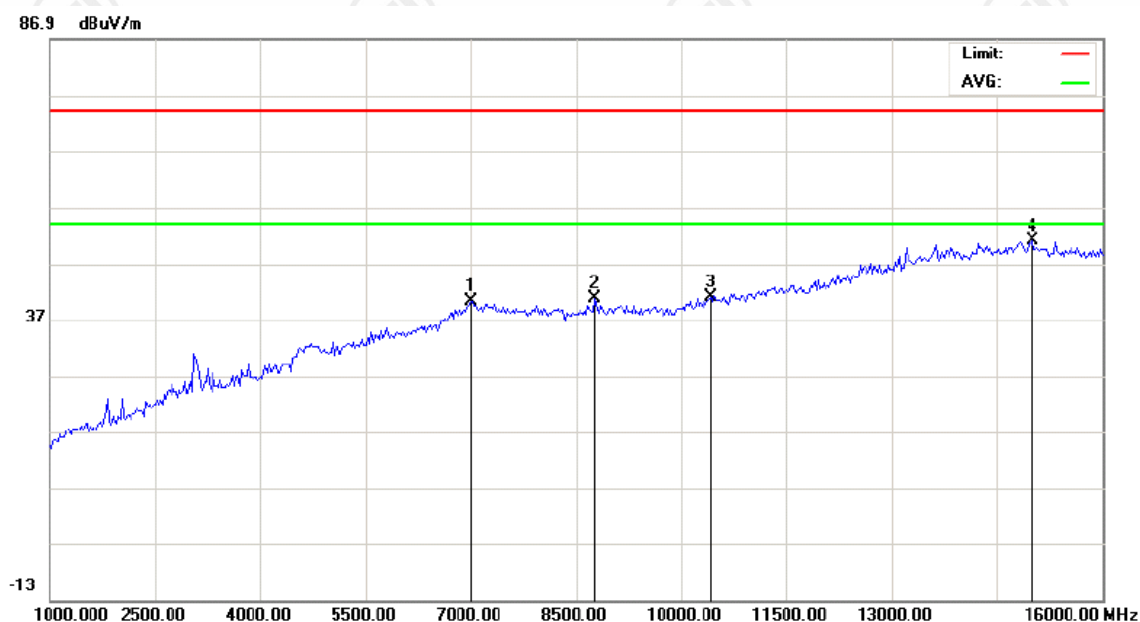
Site site #1 Polarization: **Vertical** Temperature: 24
 Limit: FCC PART15 B Radiation Power: AC 120V/60Hz Humidity: 58 %
 EUT: GNSS Receiver
 M/N: T300
 Mode: Data exchange
 Note:

| 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

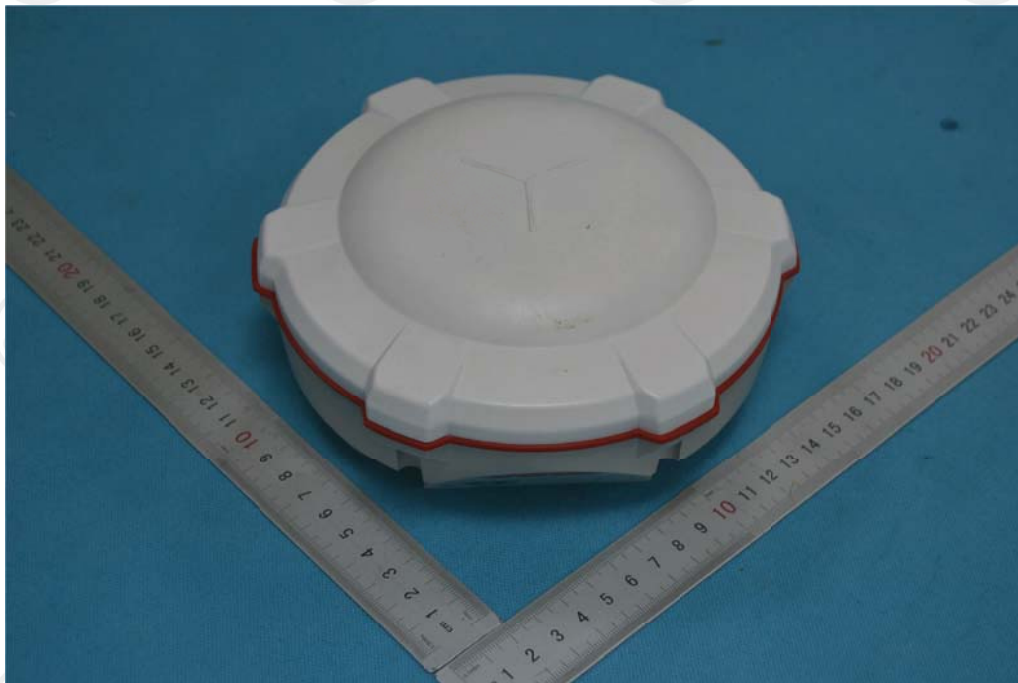


RADIATED EMISSION TEST SETUP (30MHz ~ 1GHz)



RADIATED EMISSION TEST SETUP (Above 1GHz)

APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT



External View of Product-1



External View of Product-2

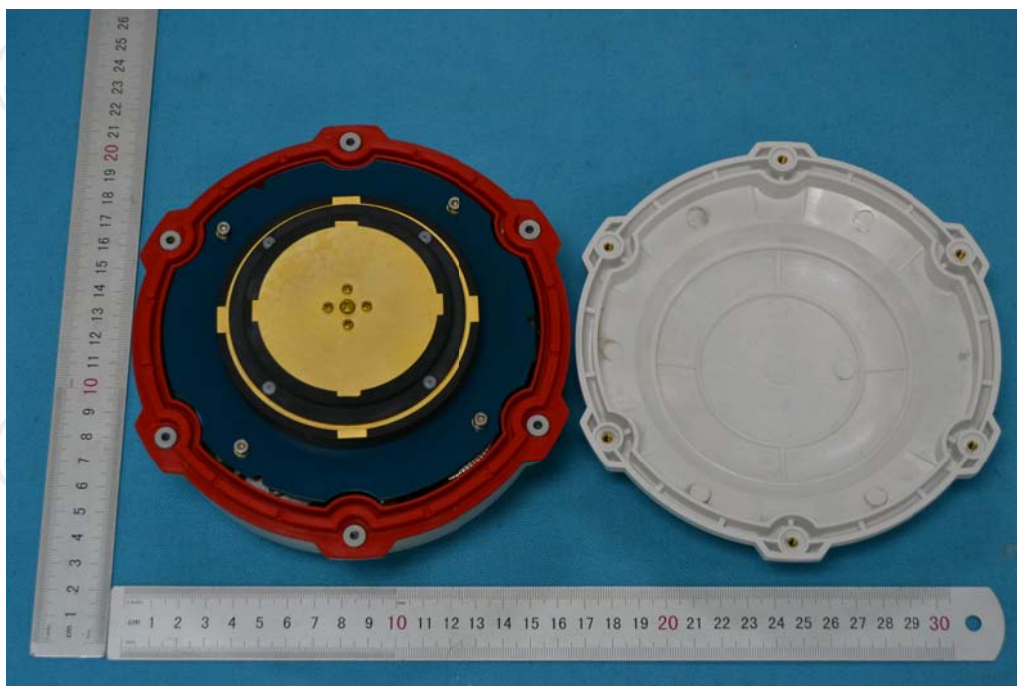
APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT



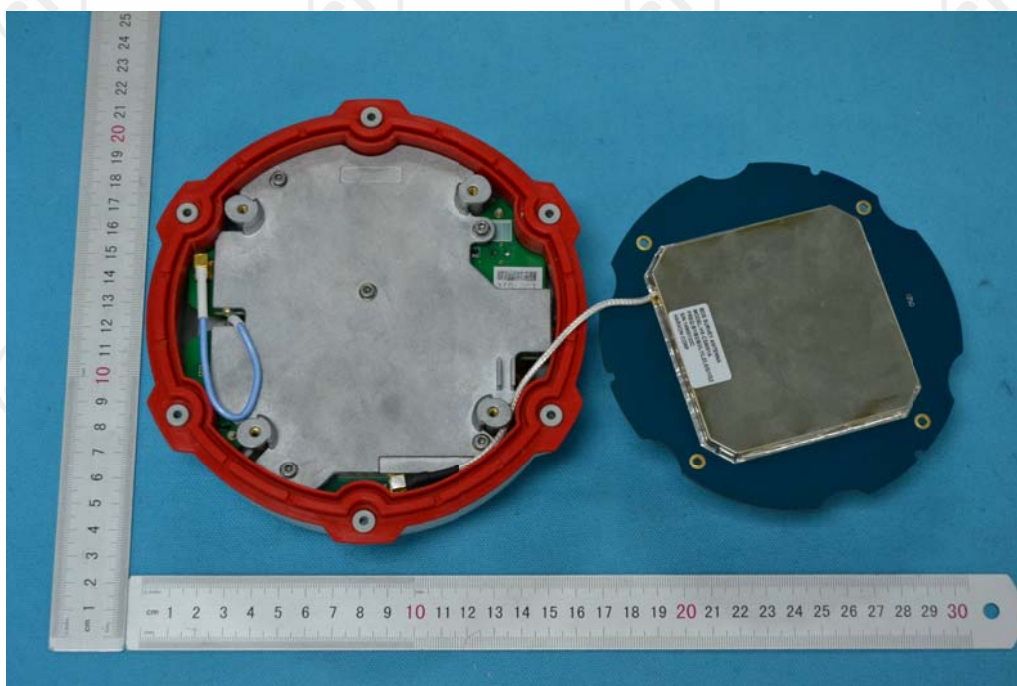
Internal View of Product-1



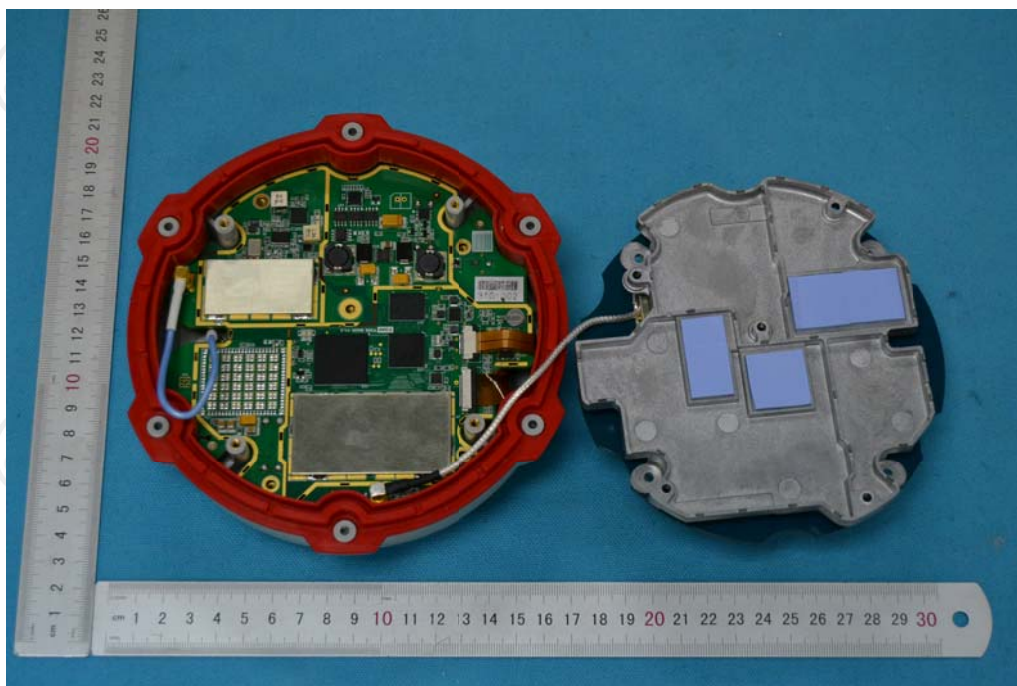
Internal View of Product-2



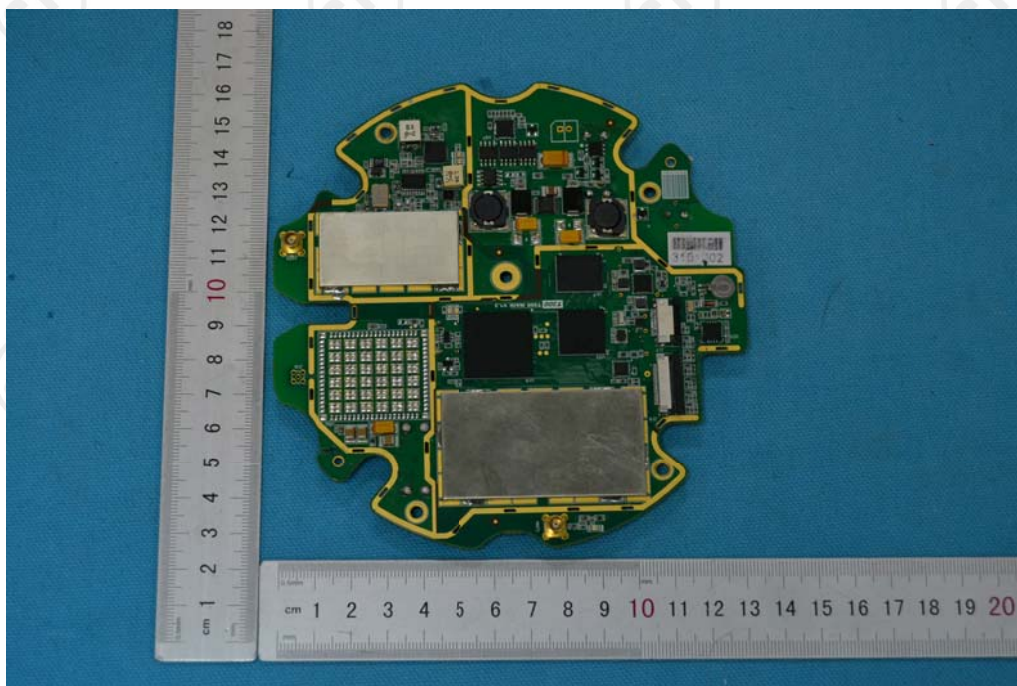
Internal View of Product-3



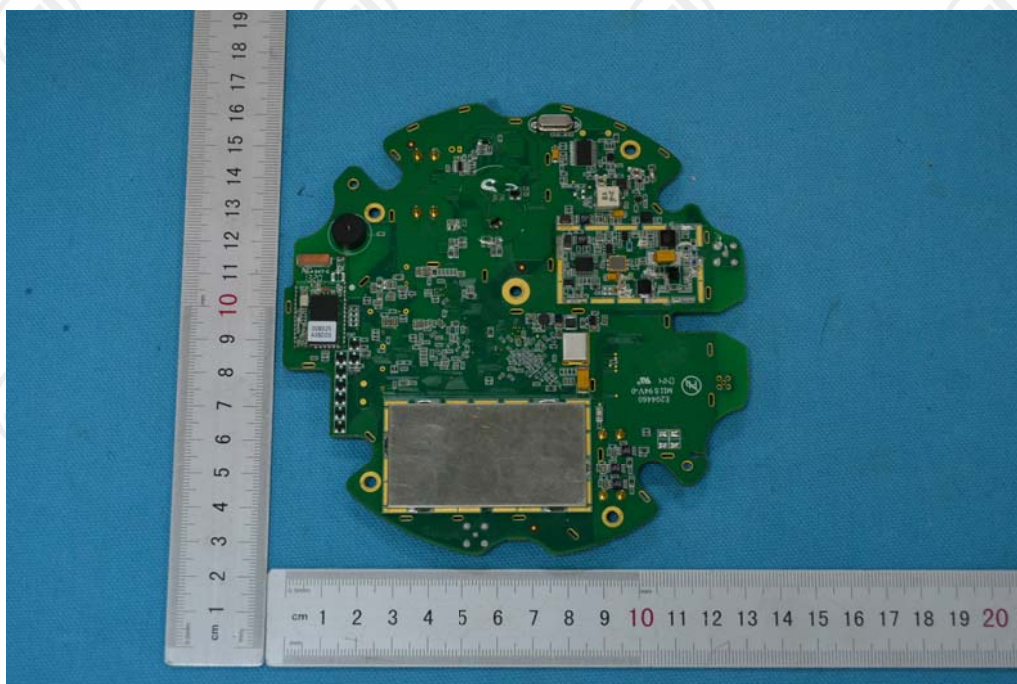
Internal View of Product-4



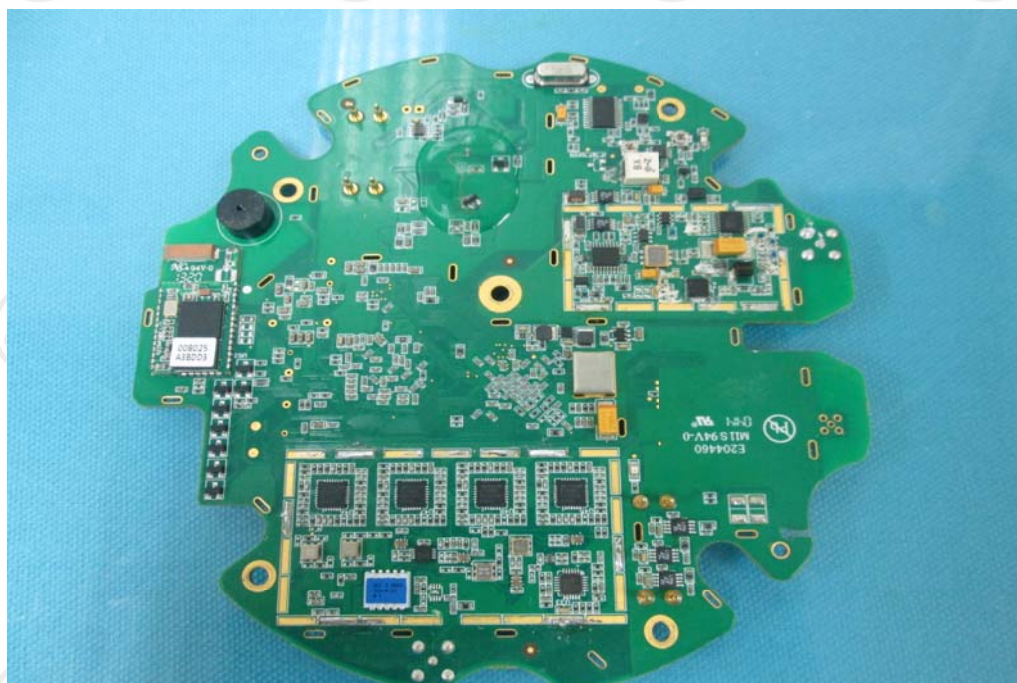
Internal View of Product-5



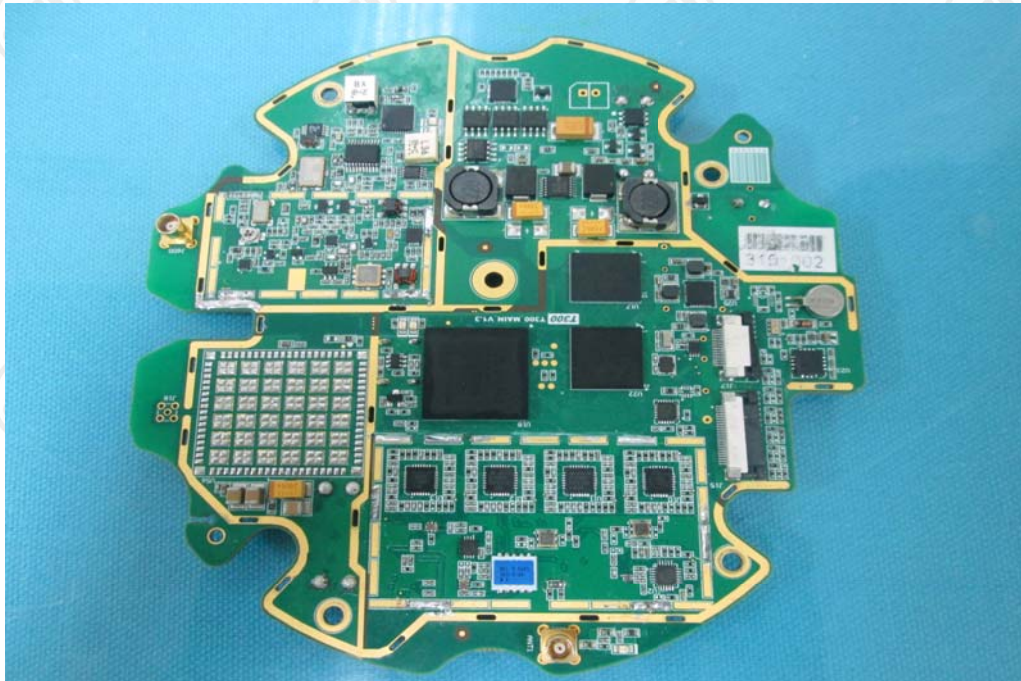
Internal View of Product-6



Internal View of Product-7



Internal View of Product-8



Internal View of Product-9

*** End of Report ***

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