



FCC Test Report

FCC ID: 2A6X8-S2

Applicant: Shanghai Huawei Internet of Things Technology Co., Ltd
Address: Room 6-178, 2nd Floor, No. 2351 Changjiang West Road, Baoshan District, Shanghai
Manufacturer: Shanghai Huawei Internet of Things Technology Co., Ltd
Address: Room 6-178, 2nd Floor, No. 2351 Changjiang West Road, Baoshan District, Shanghai
EUT: GPS tracker
Trade Mark: N/A
Model Number: S2
S6
Date of Receipt: Apr. 26, 2022
Test Date: Apr. 26, 2022 – May. 10, 2022
Date of Report: May. 10, 2022
Prepared By: Shenzhen DL Testing Technology Co., Ltd.
Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China
Applicable Standards: FCC CFR Title 47 Part22 Subpart H
FCC CFR Title 47 Part24 Subpart E
ANSI/TIA-603-E-2016
FCC KDB 971168 D01 Power Meas. License Digital Systems v03v01
ANSI C63.26:2015
Test Result: Pass
Report Number: DL-20220510039E

Prepared (Test Engineer): Pxing Huang
Reviewer (Supervisor): Jack Bu
Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.

**TABLE OF CONTENTS**

| | |
|-----------------------------------------------|-----------|
| Test Report Declaration | Page |
| 1. TEST SUMMARY | 3 |
| 2. GENERAL PRODUCT INFORMATION | 4 |
| 2.1. Description of Device (EUT) | 4 |
| 2.2. Product Function | 4 |
| 2.3. Independent Operation Modes | 4 |
| 3. TEST SITES | 5 |
| 3.1. Test Facilities | 5 |
| 3.2. Measurement Uncertainty | 5 |
| 3.3. List of Test and Measurement Instruments | 6 |
| 4. TEST SET-UP | 7 |
| 4.1. Principle of Configuration Selection | 7 |
| 4.2. Block Diagram of Test Set-up | 7 |
| 4.3. Test Environment: | 7 |
| 5. EMISSION TEST RESULTS | 8 |
| 5.1. Conducted RF Output Power | 8 |
| 5.2. -26dB and 99% Occupied Bandwidth | 9 |
| 5.3. Peak to Average Ratio | 14 |
| 5.4. Frequency Stability | 19 |
| 5.5. Conducted Spurious Emissions | 22 |
| 5.6. Conducted Out of Band Emissions | 29 |
| 5.7. Transmitter Radiated Power (EIRP/ERP) | 34 |
| 5.8. Radiated Out of Band Emissions | 36 |
| 6. PHOTOGRAPHS OF TEST SET-UP | 39 |
| 7. PHOTOGRAPHS OF THE EUT | 40 |

**1. TEST SUMMARY**

| Test Items | Test Requirement | Result |
|---------------------------------------|---------------------------------------|--------|
| Conducted RF Output Power | 2.1046 | PASS |
| Peak to Average Ratio | 2.1046, 24.232 | PASS |
| 99% & -26 dB Occupied Bandwidth | 2.1049, 22.917 24.238, | PASS |
| Frequency Stability | 2.1055, 22.355 24.235, 27.54 | PASS |
| Conducted Out of Band Emissions | 2.1051,2.1057 22.917, 24.238 | PASS |
| Band Edge | 2.1051,2.1057 22.917, 24.238 | PASS |
| Transmitter Radiated Power (EIPR/ERP) | 22.913, 24.232 | PASS |
| Radiated Out of Band Emissions | 2.1053,2.1057 22.917, 24.238 | PASS |



2. GENERAL PRODUCT INFORMATION

2.1. Description of Device (EUT)

| | |
|------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Product Name: | GPS tracker |
| Trademark | N/A |
| Model No.: | S2, S6 |
| Test Model: | S2 |
| Model Difference | All samples are the same except the model number and appearance color, so we prepare "S2" for test only. |
| Operation Frequency: | GSM 850: Tx: 824.20 - 848.80MHz; Rx: 869.20 - 893.80MHz GSM1900: Tx: 1850.20 - 1909.80MHz; Rx: 1930.20 - 1989.80MHz |
| Modulation technology: | GSM Mode with GMSK Modulation |
| Antenna Type: | Internal Antenna |
| Antenna gain: | 2.0dBi |
| Power supply: | DC 12V from battery |
| Hardware Version | HV10 |
| Software Version | SV10 |

2.2. Product Function

Refer to Technical Construction Form and User Manual.

2.3. Independent Operation Modes

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

| Test modes | | |
|------------|----------|-----------|
| Band | Radiated | Conducted |
| GSM | GSM/GPRS | GSM/GPRS |

| Test Channel (MHz) | | | |
|--------------------|---------|---------|---------|
| Band | Low | Middle | High |
| GSM850 | 824.20 | 836.60 | 848.80 |
| GSM1900 | 1850.20 | 1880.00 | 1909.80 |



3. TEST SITES

3.1. Test Facilities

Site Description

Name of Firm : Shenzhen DL Testing Technology Co., Ltd.

Site Location : 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

3.2. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

| No. | Item | Uncertainty |
|-----|------------------------------|---------------------|
| 1 | Conducted Emission Test | $\pm 1.38\text{dB}$ |
| 2 | RF power,conducted | $\pm 0.16\text{dB}$ |
| 3 | Spurious emissions,conducted | $\pm 0.21\text{dB}$ |
| 4 | All emissions,radiated(<1G) | $\pm 4.68\text{dB}$ |
| 5 | All emissions,radiated(>1G) | $\pm 4.89\text{dB}$ |
| 6 | Temperature | $\pm 0.5\text{C}$ |
| 7 | Humidity | $\pm 2\%$ |



3.3. List of Test and Measurement Instruments

3.3.1. For conducted emission at the mains terminals test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|-------------------|--------------|-----------|------------|---------------|---------------|
| 843 Shielded Room | ChengYu | 843 Room | 843 | Nov. 25, 2019 | Nov. 24, 2022 |
| EMI Receiver | R&S | ESR | 101421 | Nov. 06, 2021 | Nov. 05, 2022 |
| LISN | R&S | ENV216 | 102417 | Nov. 06, 2021 | Nov. 05, 2022 |
| 843 Cable 1# | ChengYu | CE Cable | 001 | Nov. 06, 2021 | Nov. 05, 2022 |
| 843 Cable 1# | FUJIKURA | 843C1# | 001 | Nov. 06, 2021 | Nov. 05, 2022 |

3.3.2. For radiated test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|-------------------------------------|-----------------|--------------------|------------|---------------|---------------|
| Spectrum Analyzer (9kHz-26.5GHz) | Agilent | E4408B | MY50140780 | Nov. 06, 2021 | Nov. 05, 2022 |
| Test Receiver (9kHz-7GHz) | R&S | ESRP7 | 101393 | Nov. 06, 2021 | Nov. 05, 2022 |
| Bilog Antenna (30MHz-1GHz) | R&S | VULB9162 | 00306 | Nov. 06, 2021 | Nov. 05, 2022 |
| Bilog Antenna (30MHz-1GHz) | R&S | VULB9163 | 9163-519 | Nov. 06, 2021 | Nov. 05, 2022 |
| Horn Antenna | R&S | BBHA9170 | 9170C-531 | Nov. 06, 2021 | Nov. 05, 2022 |
| Horn Antenna | R&S | BBHA 9120D | 01774 | Nov. 06, 2021 | Nov. 05, 2022 |
| Horn Antenna (18-40GHz) | A.H. Systems | SAS-574 | 588 | Nov. 06, 2021 | Nov. 05, 2022 |
| Amplifier (9KHz-6GHz) | Schwarzbeck | BBV9743B | 00153 | Nov. 06, 2021 | Nov. 05, 2022 |
| Amplifier(1GHz-18GHz) | EMEC | EM01G8GA | 00270 | Nov. 06, 2021 | Nov. 05, 2022 |
| Amplifier(18GHz-40GHz) | Quanjuda | DLE-161 | 97 | Nov. 06, 2021 | Nov. 05, 2022 |
| Loop Antenna(9KHz-30MHz) | Schwarzbeck | FMZB1519B | 00014 | Nov. 06, 2021 | Nov. 05, 2022 |
| RF cables1 (9kHz-1GHz) | ChengYu | 966 | 004 | Nov. 06, 2021 | Nov. 05, 2022 |
| RF cables2 (1GHz-40GHz) | ChengYu | 966 | 003 | Nov. 06, 2021 | Nov. 05, 2022 |
| Antenna connector | Florida RF Labs | N/A | RF 01# | Nov. 06, 2021 | Nov. 05, 2022 |
| Power probe | KEYSIGHT | U2021XA | MY55210018 | Nov. 06, 2021 | Nov. 05, 2022 |
| Signal Analyzer | Agilent | N9020A | MY55370280 | Nov. 06, 2021 | Nov. 05, 2022 |
| Test Receiver | R&S | ESU 40 | 100376 | Nov. 06, 2021 | Nov. 05, 2022 |
| D.C. Power Supply | LongWei | PS-305D | 010964729 | Nov. 06, 2021 | Nov. 05, 2022 |
| Signal Amplifier | DAZE | ZN3380B | 11235 | Nov. 06, 2021 | Nov. 05, 2022 |
| High Pass filter | KANGMAI | WHKX1.0/1.5G-10SS | 40 | Nov. 06, 2021 | Nov. 05, 2022 |
| Filter | COM-MW | ZBSF-C836.5-25-X | BCTC042 | Nov. 06, 2021 | Nov. 05, 2022 |
| Filter | COM-MW | ZBSF-C1747.5-75-X2 | BCTC045 | Nov. 06, 2021 | Nov. 05, 2022 |
| Filter | COM-MW | ZBSF-C1880-60-X2 | BCTC047 | Nov. 06, 2021 | Nov. 05, 2022 |
| Splitter | Agilent | 11435B | 1125162 | Nov. 06, 2021 | Nov. 05, 2022 |

RF CONDUCTED TEST

| | | | | | |
|------------------------------------------|---------|---------------|-------------|---------------|---------------|
| System Simulator | Agilent | E5515C | GB43130252 | Nov. 06, 2021 | Nov. 05, 2022 |
| Spectrum Analyzer | Agilent | N9020A | MY45108040 | Nov. 06, 2021 | Nov. 05, 2022 |
| DC Power Supply | LongWei | PS-305D | 010965682 | Nov. 06, 2021 | Nov. 05, 2022 |
| Constant temperature and humidity box | GF | GTH-800-40-2P | MAA9906-012 | Nov. 06, 2021 | Nov. 05, 2022 |
| Universal radio communication tester | R&S | CMW500 | 115295 | Nov. 06, 2021 | Nov. 05, 2022 |



4. TEST SET-UP

4.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

4.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



4.3. Test Environment:

Ambient conditions in the test laboratory:

| Items | Actual |
|------------------|--------|
| Temperature (°C) | 21~23 |
| Humidity (%RH) | 50~65 |



5. EMISSION TEST RESULTS

5.1. Conducted RF Output Power

5.1.1. Limit

According to FCC section 2.1046(a), FCC part 22.913(a), FCC part 22.50(a) and FCC part 24.232(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

5.1.2. Test Setup

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power.

5.1.3. Test Result

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

Pass, the table and plot please see annex.

The conducted power tables are as follows:

| Average Conducted Power(dBm) | | | | | | |
|------------------------------|--------|--------|--------|---------|---------|---------|
| Band | GSM850 | | | PCS1900 | | |
| Channel | 128 | 190 | 251 | 512 | 661 | 810 |
| Frequency | 824.20 | 836.60 | 848.80 | 1850.20 | 1880.00 | 1909.80 |
| GSM | 32.03 | 32.22 | 32.44 | 29.02 | 29.17 | 29.64 |
| GPRS (GMSK, 1 TX slot) | 32.01 | 32.21 | 32.41 | 29.00 | 29.16 | 29.62 |
| GPRS (GMSK, 2 TX slot) | 31.26 | 31.46 | 31.66 | 28.22 | 28.41 | 28.87 |
| GPRS (GMSK, 3 TX slot) | 29.29 | 29.49 | 29.69 | 26.25 | 26.43 | 26.89 |
| GPRS (GMSK, 4 TX slot) | 27.18 | 27.38 | 27.58 | 24.15 | 24.33 | 24.79 |



5.2. -26dB and 99% Occupied Bandwidth

5.2.1. Limit

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth,

5.2.2. Test Setup

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power.

5.2.3. Test Result

Pass, the next page

| EUT Mode | Channel | Frequency (MHz) | 99% Occupy bandwidth (KHz) | -26dB bandwidth (KHz) |
|-----------------|---------|-----------------|----------------------------|-----------------------|
| GSM 850 | 128 | 824.20 | 243.14 | 318.9 |
| | 190 | 836.60 | 242.83 | 316.5 |
| | 251 | 848.80 | 243.73 | 319.4 |
| GSM 850 (GPRS) | 128 | 824.20 | 242.21 | 319.3 |
| | 190 | 836.60 | 244.59 | 320.9 |
| | 251 | 848.80 | 244.34 | 322.6 |
| PCS 1900 | 512 | 1850.20 | 245.05 | 317.5 |
| | 661 | 1880.00 | 243.21 | 317.8 |
| | 810 | 1909.80 | 243.44 | 320.2 |
| PCS 1900 (GPRS) | 512 | 1850.20 | 241.22 | 317.6 |
| | 661 | 1880.00 | 243.20 | 317.8 |
| | 810 | 1909.80 | 244.03 | 320.4 |

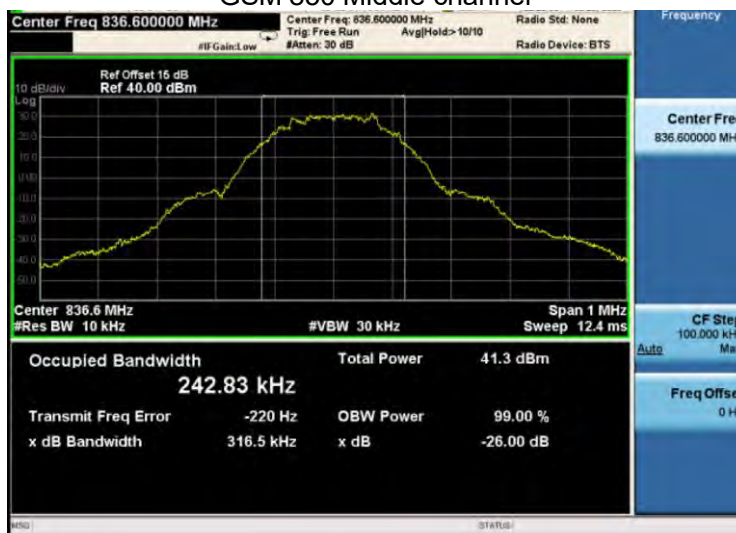


Test plot as follows:

GSM 850 Lowest channel



GSM 850 Middle channel



GSM 850 Highest channel:





GPRS 850MHz Lowest channel



GPRS 850MHz Middle channel



GPRS 850MHz Highest channel





PCS 1900 Lowest channel



PCS 1900 Middle channel



PCS 1900 Highest channel





GPRS 1900 Lowest channel



GPRS 1900 Middle channel



GPRS 1900 Highest channel



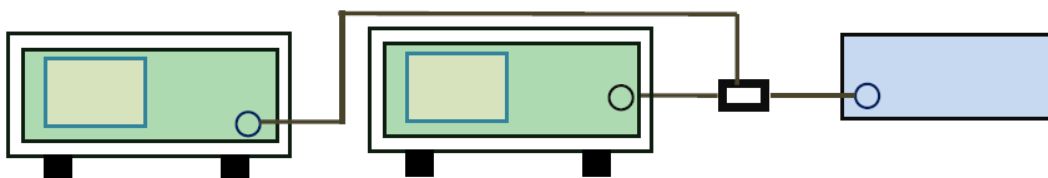


5.3. Peak to Average Ratio

5.3.1. Limit

According to FCC section 27.50(d)(5), 22.913, 24.232 the peak to average ratio(PAR) of the transmission may not exceed 13dB.

5.3.2. Test Setup



5.3.3. Test Procedure

According with KDB 971168 v02r02

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

5.3.4. Test Result

Measurement data as follows:

| Band | Channel | Peak-Average Ratio(PAR) | Limit (dB) | Result |
|----------|---------|-------------------------|------------|--------|
| GSM 850 | Low | 0.28 | ≤13 | Pass |
| | Middle | 0.30 | ≤13 | Pass |
| | High | 0.48 | ≤13 | Pass |
| GPRS850 | Low | 0.27 | ≤13 | Pass |
| | Middle | 0.36 | ≤13 | Pass |
| | High | 0.33 | ≤13 | Pass |
| GSM1900 | Low | 0.52 | ≤13 | Pass |
| | Middle | 0.39 | ≤13 | Pass |
| | High | 0.55 | ≤13 | Pass |
| GPRS1900 | Low | 0.27 | ≤13 | Pass |
| | Middle | 0.45 | ≤13 | Pass |
| | High | 0.68 | ≤13 | Pass |



GSM 850 Lowest channel



GSM 850 Middle channel



GSM 850 Highest channel:





GPRS 850MHz Lowest channel



GPRS 850MHz Middle channel



GPRS 850MHz Highest channel





PCS 1900 Lowest channel



PCS 1900 Middle channel



PCS 1900 Highest channel





GPRS 1900 Lowest channel



GPRS 1900 Middle channel



GPRS 1900 Highest channel





5.4. Frequency Stability

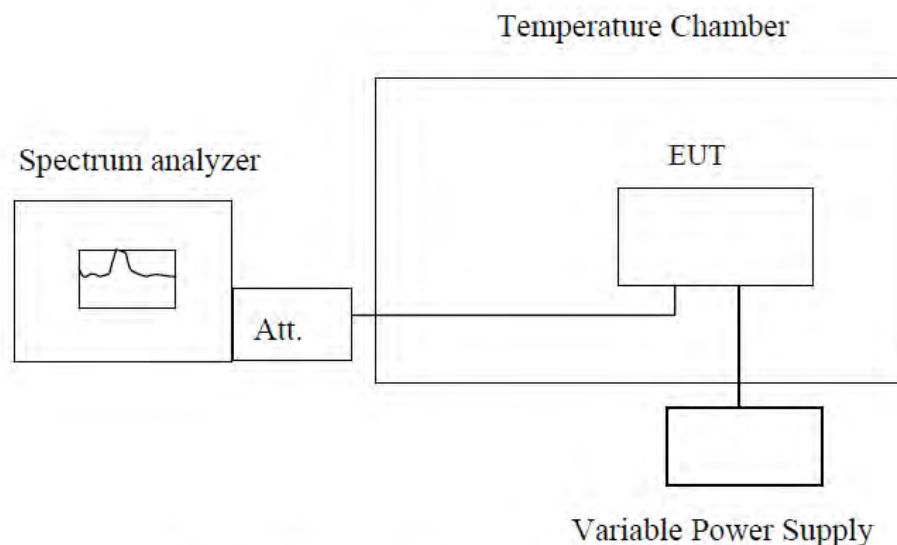
5.4.1. Limit

According to FCC section 22.335 and FCC section 24.235, FCC section 27.54 the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

(a) The temperature is varied from -40°C to $+80^{\circ}\text{C}$ at intervals of not more than 10°C .

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

5.4.2. Test Setup



Note : Measurement setup for testing on Antenna connector

The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber.

The EUT is commanded by the System Simulator (SS) to operate at the maximum output power

5.4.3. Test Result

The nominal, highest and lowest extreme voltages are separately are specified by the applicant; the normal temperature here used is 25°C .

For LTE mode, only test the max bandwidth.

The table and plot please see annex.



| Test Conditions | | | Frequency Deviation | | | Result |
|------------------------------------------|------------|-----------------|---------------------|--------|-------|--------|
| Band | Power(Vdc) | Temperature(°C) | Frequency Error(Hz) | ppm | Limit | |
| GSM850 Middle channel 836.0MHz | 12.0 | -40 | 54 | 0.0646 | ±2.5 | PASS |
| | 12.0 | -30 | 34 | 0.0407 | | |
| | 12.0 | -20 | 59 | 0.0706 | | |
| | 12.0 | -10 | 63 | 0.0754 | | |
| | 12.0 | 0 | 23 | 0.0275 | | |
| | 12.0 | 10 | 43 | 0.0514 | | |
| | 12.0 | 20 | 41 | 0.0490 | | |
| | 12.0 | 30 | 94 | 0.1124 | | |
| | 12.0 | 40 | 16 | 0.0191 | | |
| | 12.0 | 50 | 42 | 0.0502 | | |
| | 12.0 | 60 | 94 | 0.1124 | | |
| | 12.0 | 70 | 38 | 0.0455 | | |
| | 12.0 | 80 | 81 | 0.0969 | | |
| | 13.2 | 25 | 102 | 0.1220 | | |
| | 12.0 | 25 | 26 | 0.0311 | | |
| | 10.8 | 25 | 76 | 0.0909 | | |
| GPRS850 Middle channel 836.0MHz | 12.0 | -40 | 81 | 0.0969 | ±2.5 | PASS |
| | 12.0 | -30 | 56 | 0.0670 | | |
| | 12.0 | -20 | 42 | 0.0502 | | |
| | 12.0 | -10 | 44 | 0.0526 | | |
| | 12.0 | 0 | 32 | 0.0383 | | |
| | 12.0 | 10 | 78 | 0.0933 | | |
| | 12.0 | 20 | 45 | 0.0538 | | |
| | 12.0 | 30 | 62 | 0.0742 | | |
| | 12.0 | 40 | 93 | 0.1112 | | |
| | 12.0 | 50 | 34 | 0.0407 | | |
| | 12.0 | 60 | 82 | 0.0981 | | |
| | 12.0 | 70 | 83 | 0.0993 | | |
| | 12.0 | 80 | 42 | 0.0502 | | |
| | 13.2 | 25 | 112 | 0.1340 | | |
| | 12.0 | 25 | 32 | 0.0383 | | |
| | 10.8 | 25 | 81 | 0.0969 | | |



| Test Conditions | | | Frequency Deviation | | | Result |
|---------------------------------------------|------------|-----------------|---------------------|--------|-------|--------|
| Band | Power(Vdc) | Temperature(°C) | Frequency Error(Hz) | ppm | Limit | |
| GSM1900 Middle channel 1880.0MHz | 12.0 | -40 | 52 | 0.0277 | ±2.5 | PASS |
| | 12.0 | -30 | 43 | 0.0229 | | |
| | 12.0 | -20 | 52 | 0.0277 | | |
| | 12.0 | -10 | 35 | 0.0186 | | |
| | 12.0 | 0 | 52 | 0.0277 | | |
| | 12.0 | 10 | 65 | 0.0346 | | |
| | 12.0 | 20 | 41 | 0.0218 | | |
| | 12.0 | 30 | 32 | 0.0170 | | |
| | 12.0 | 40 | 55 | 0.0293 | | |
| | 12.0 | 50 | 52 | 0.0277 | | |
| | 12.0 | 60 | 25 | 0.0133 | | |
| | 12.0 | 70 | 58 | 0.0309 | | |
| | 12.0 | 80 | 92 | 0.0489 | | |
| | 13.2 | 25 | 113 | 0.0601 | | |
| | 12.0 | 25 | 41 | 0.0218 | | |
| | 10.8 | 25 | 83 | 0.0441 | | |
| EGPRS1900 Middle channel 1880.0MHz | 12.0 | -40 | 24 | 0.0128 | ±2.5 | PASS |
| | 12.0 | -30 | 62 | 0.0330 | | |
| | 12.0 | -20 | 62 | 0.0330 | | |
| | 12.0 | -10 | 71 | 0.0378 | | |
| | 12.0 | 0 | 35 | 0.0186 | | |
| | 12.0 | 10 | 53 | 0.0282 | | |
| | 12.0 | 20 | 14 | 0.0074 | | |
| | 12.0 | 30 | 62 | 0.0330 | | |
| | 12.0 | 40 | 46 | 0.0245 | | |
| | 12.0 | 50 | 24 | 0.0128 | | |
| | 12.0 | 60 | 58 | 0.0309 | | |
| | 12.0 | 70 | 63 | 0.0335 | | |
| | 12.0 | 80 | 71 | 0.0378 | | |
| | 13.2 | 25 | 109 | 0.0580 | | |
| | 12.0 | 25 | 28 | 0.0149 | | |
| | 10.8 | 25 | 82 | 0.0436 | | |

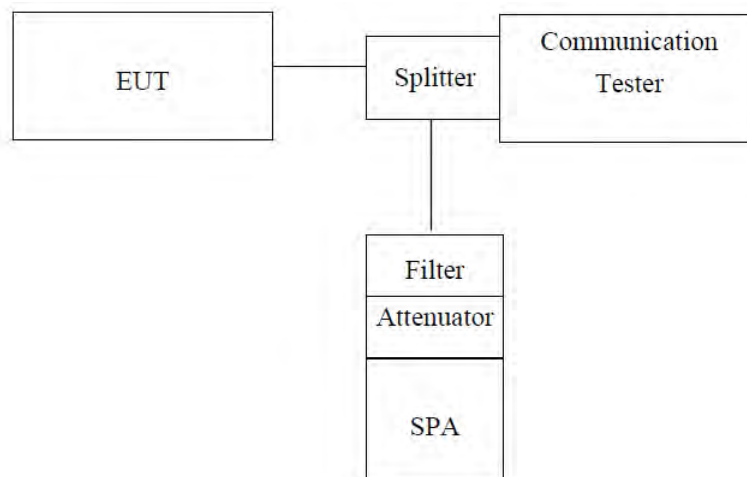


5.5. Conducted Spurious Emissions

5.5.1. Limit

According to FCC section 22.917(a) and FCC section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10*\log(P)$ dB. This calculated to be -13dBm.

5.5.2. Test Setup



Note: Measurement setup for testing on Antenna connector

5.5.3. Measurement Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW= 1MHz, VBW = 3MHz, Start=30MHz, Stop= 10th harmonic.

Limit = -13dBm

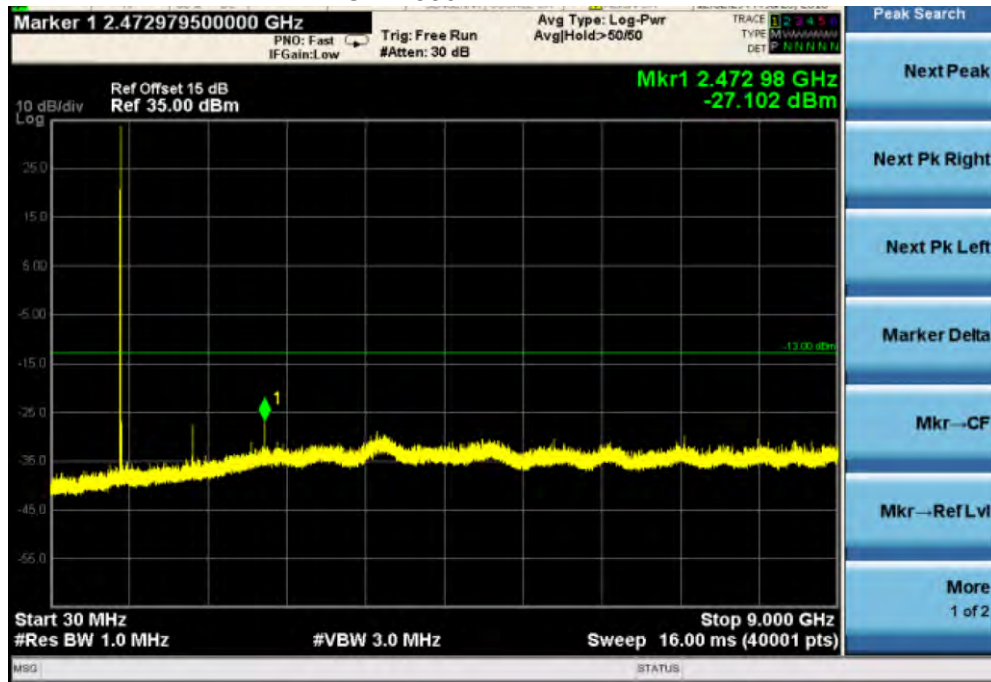
5.5.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

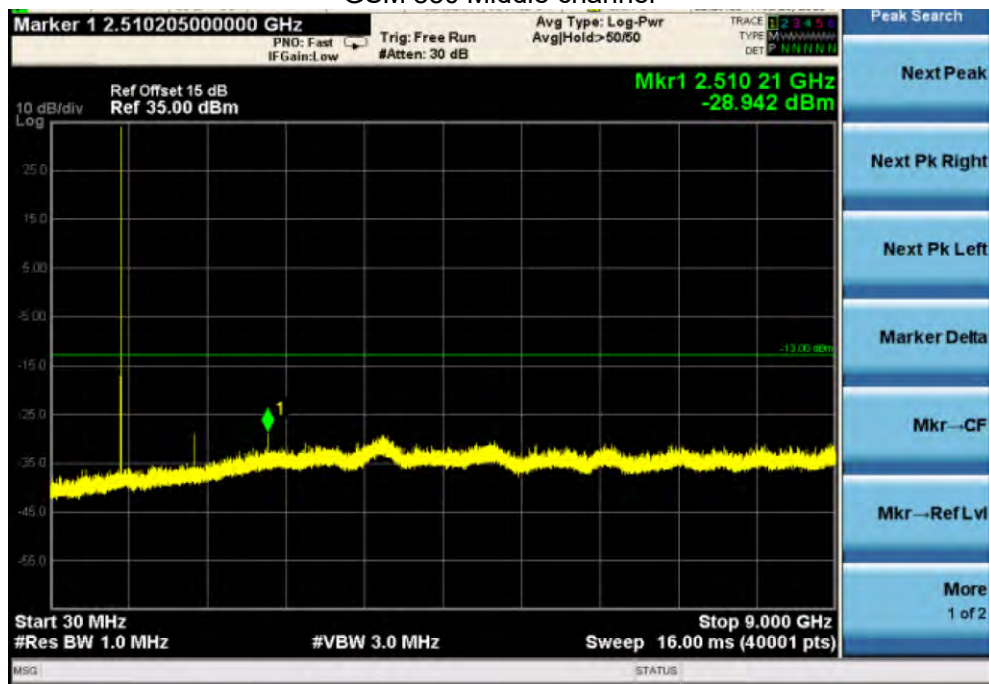
Pass, the table and plot please see next page.



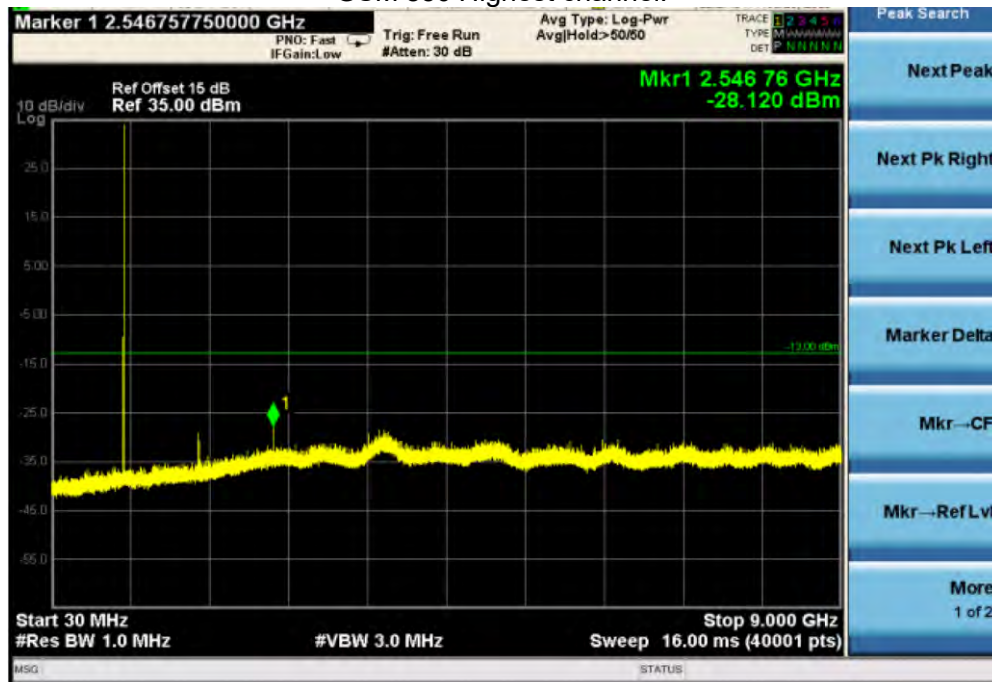
GSM 850 Lowest channel



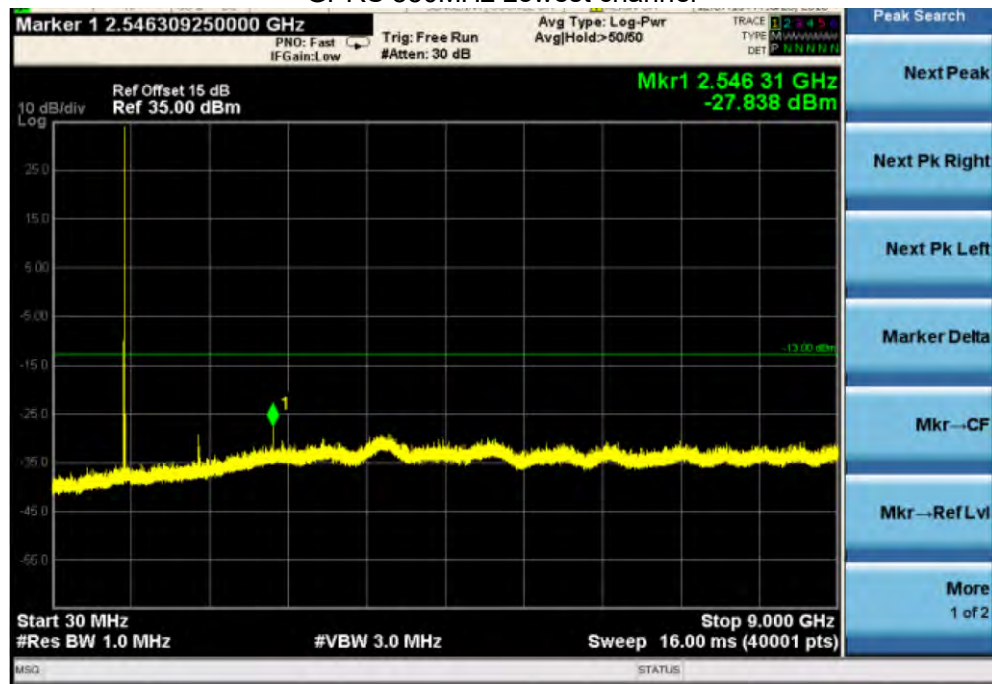
GSM 850 Middle channel



GSM 850 Highest channel:

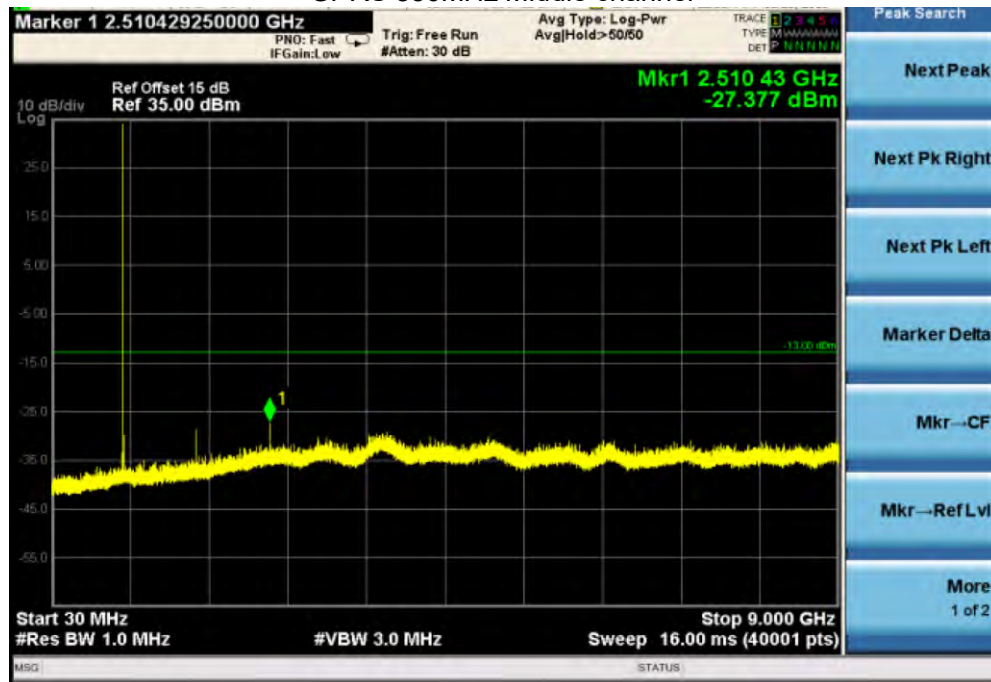


GPRS 850MHz Lowest channel

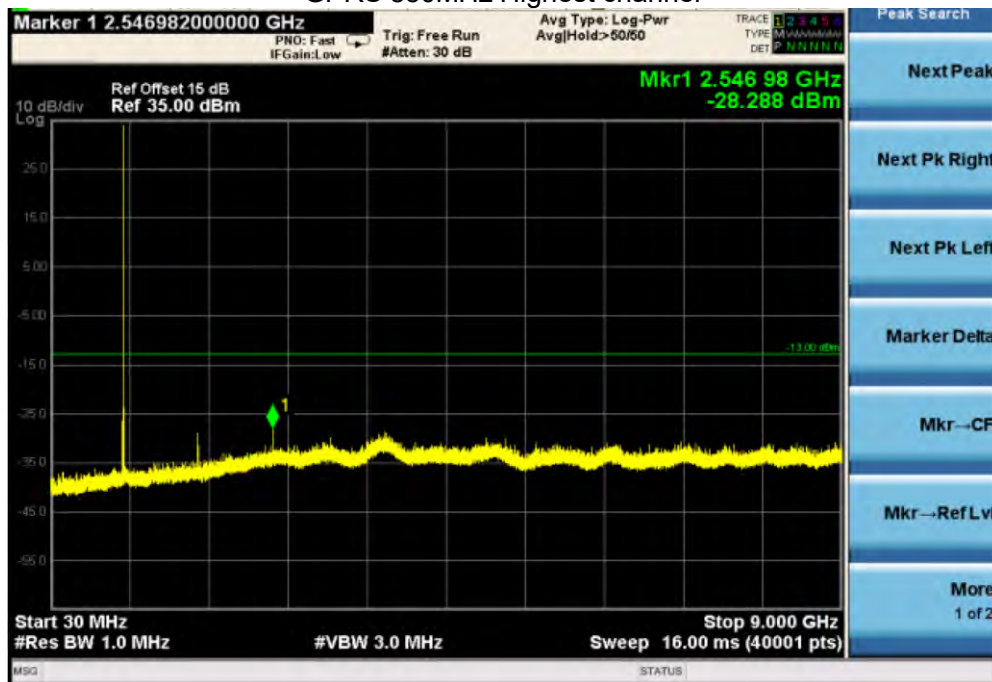




GPRS 850MHz Middle channel

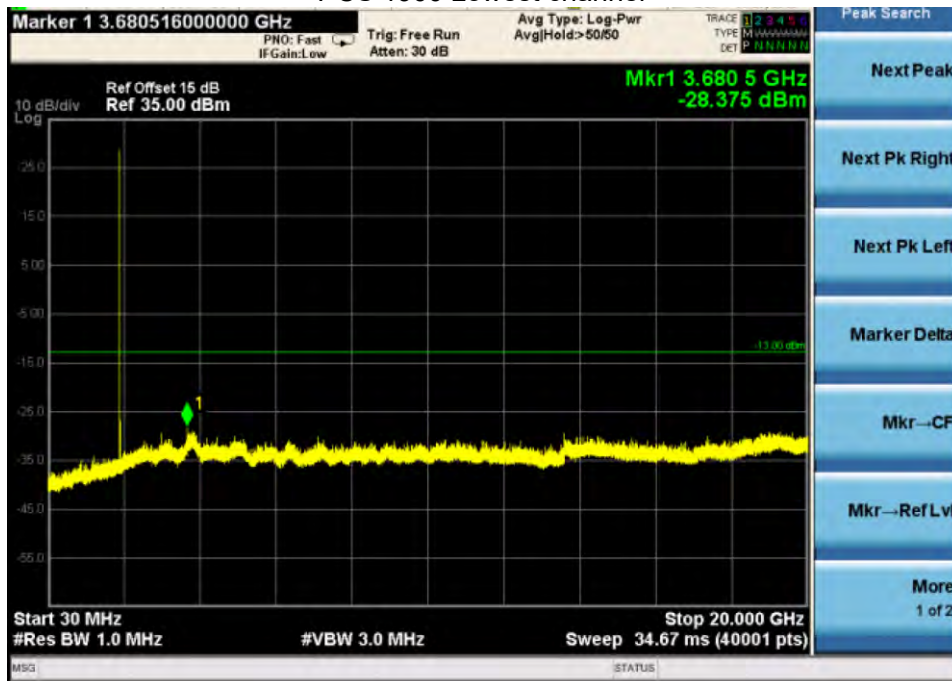


GPRS 850MHz Highest channel

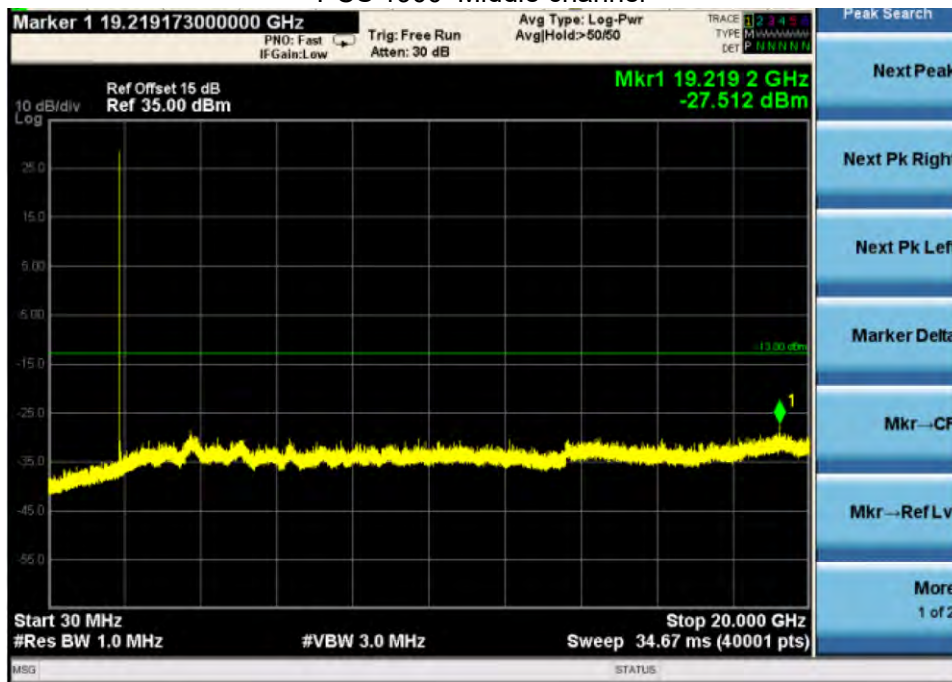




PCS 1900 Lowest channel

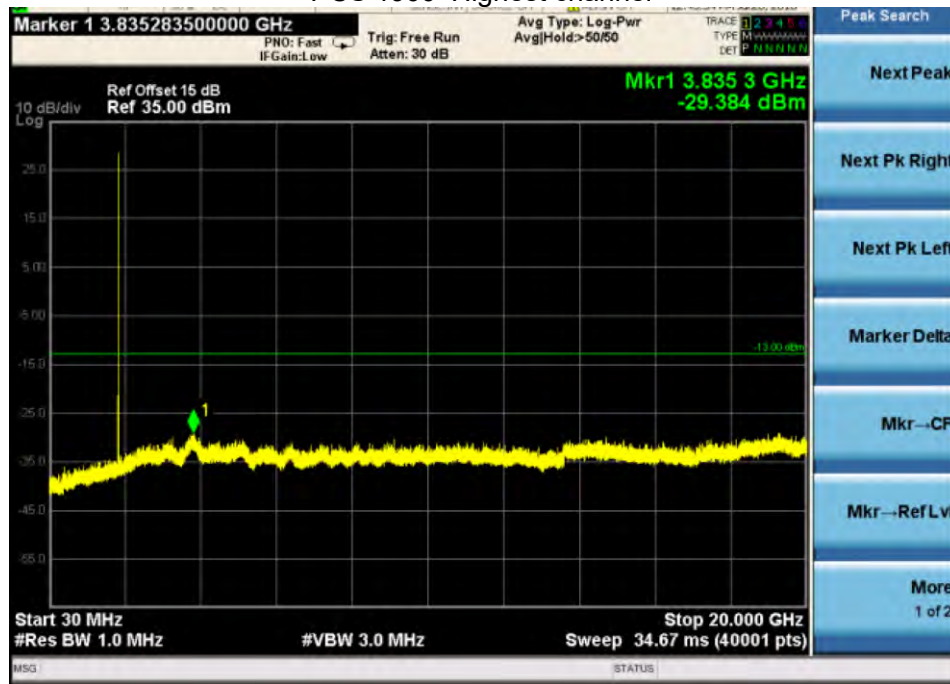


PCS 1900 Middle channel

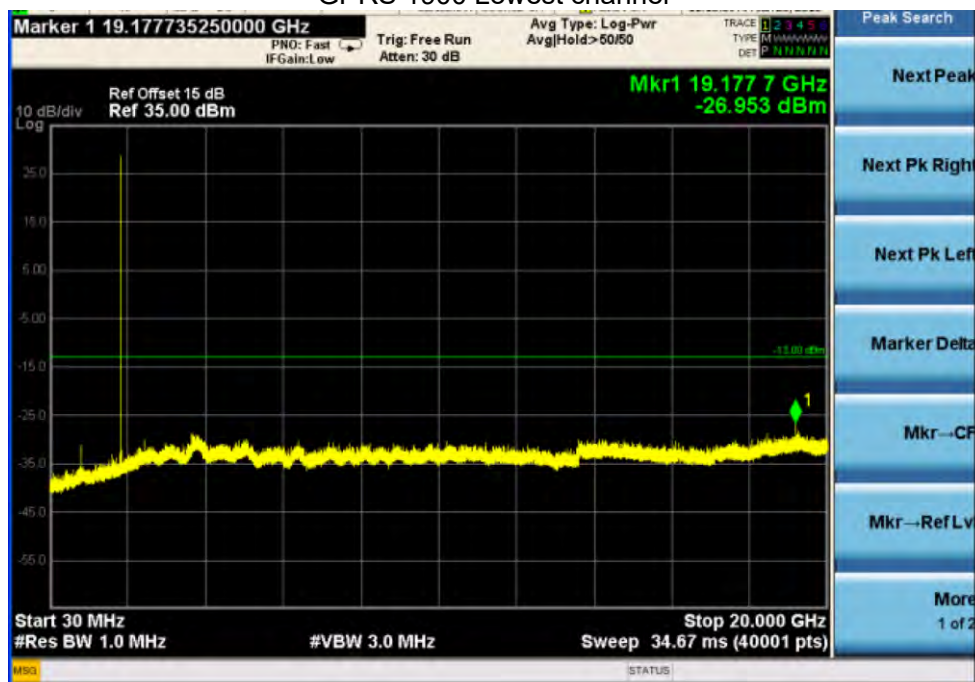




PCS 1900 Highest channel

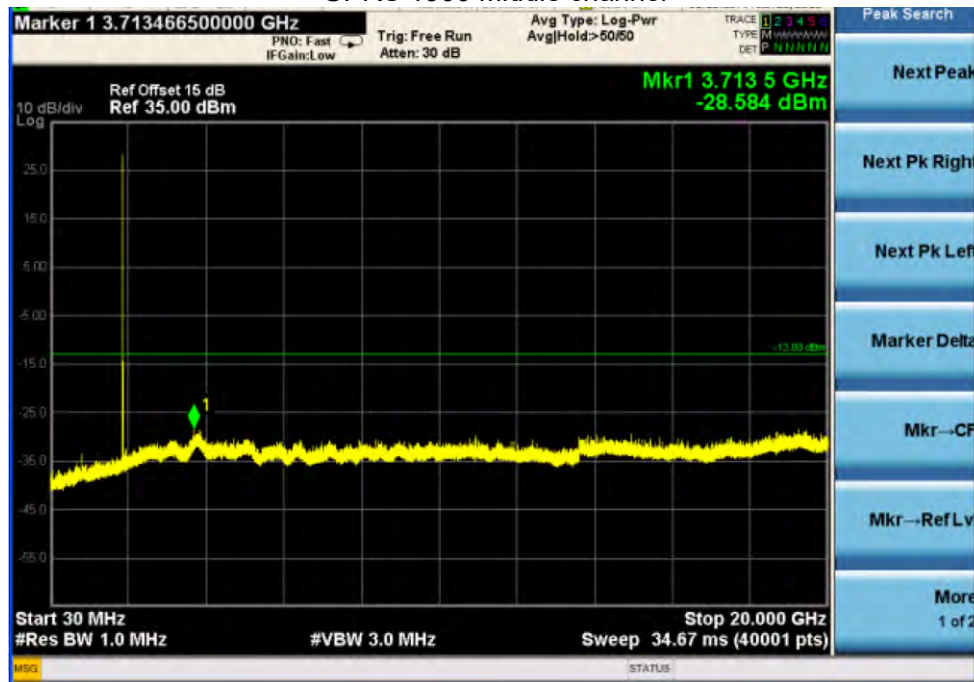


GPRS 1900 Lowest channel

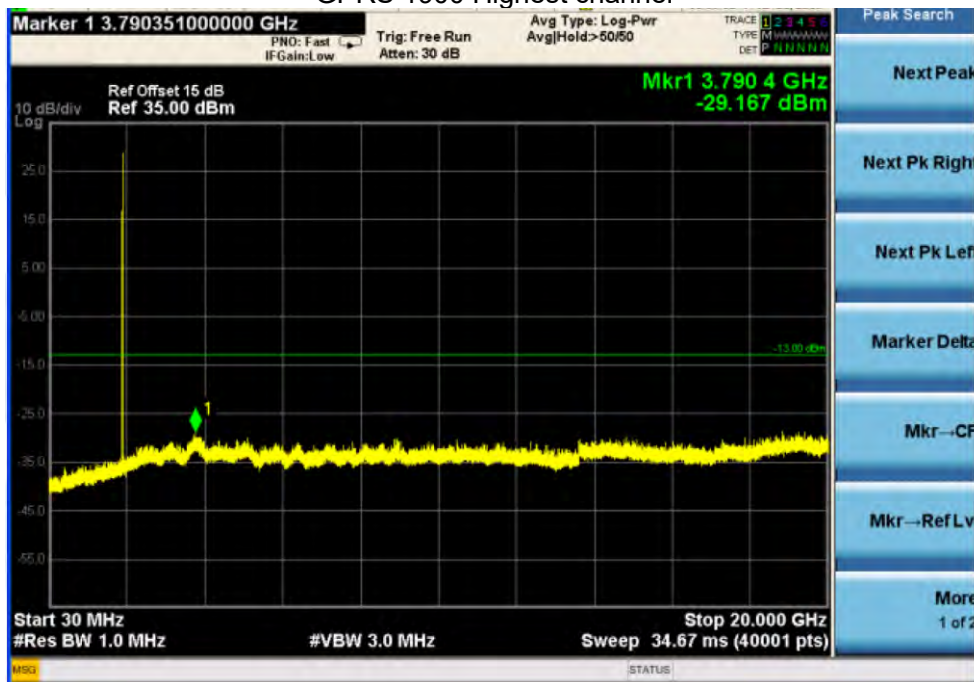




GPRS 1900 Middle channel



GPRS 1900 Highest channel



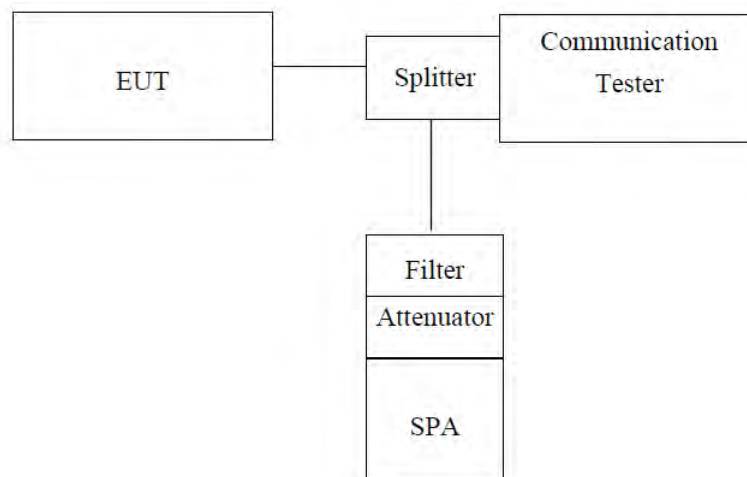


5.6. Conducted Out of Band Emissions

5.6.1. Limit

According to FCC section 22.917(b) and FCC section 24.238(b), 27.53(g)(h) in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

5.6.2. Test Setup



Note: Measurement setup for testing on Antenna connector

5.6.3. Measurement Procedure

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer and the System Simulator with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the System Simulator to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the System Simulator.

RBW is set to 3kHz,VBW is set to 10kHz for GSMS850 Lowest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GSM850 Highest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GPRS850 Lowest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GPRS850 Highest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GSMS1900 Lowest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GSM1900 Highest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GPRS1900 Lowest channel,
RBW is set to 3kHz,VBW is set to 10kHz for GPRS1900 Highest channel,

5.6.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

Pass, the table and plot please see next page.



GSM850 Lowest channel



GSM850 Highest channel:





GPRS850 Lowest channel



GPRS850 Highest channel:





GSM1900 Lowest channel

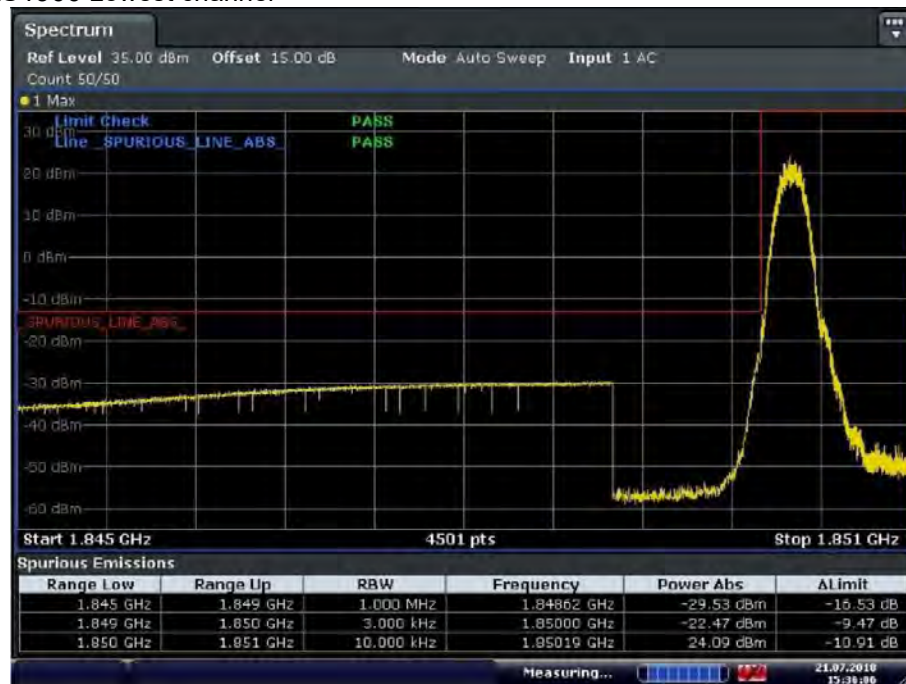


GSM1900 Highest channel:





GPRS1900 Lowest channel



GPRS1900 Highest channel:



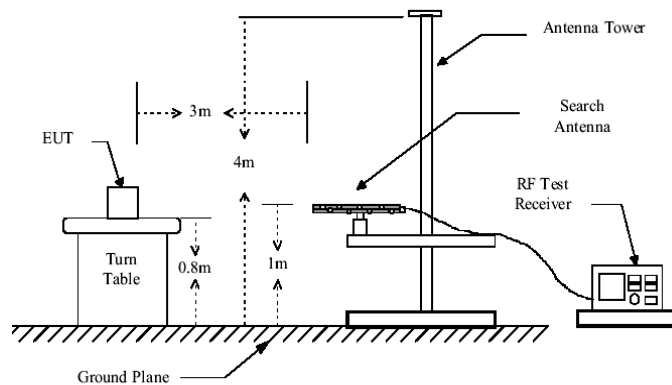
5.7. Transmitter Radiated Power (EIRP/ERP)

5.7.1. Limit

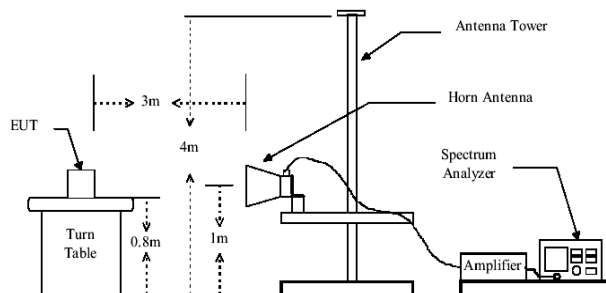
According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, FCC section 27.50 the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

5.7.2. Test Setup

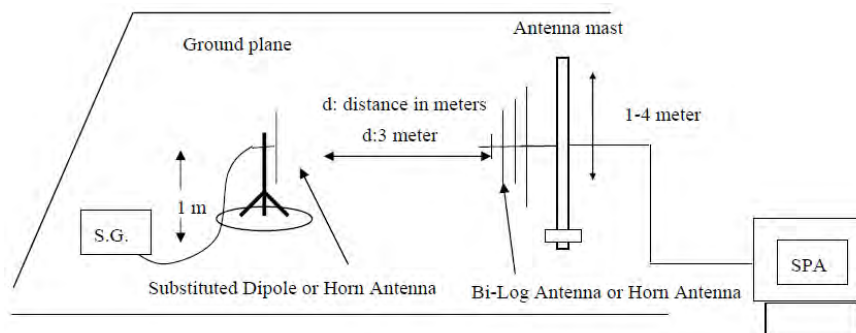
Below 1GHz



Above 1GHz



Substituted method:



5.7.3. Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. all test in Full-Anechoic Chamber.



During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)} - 2.15$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

5.7.4. Test Result

Pass, the table and plot please see next page.

| EUT mode | Channel | Antenna Pol. | S.G. output (dBm) | Antenna Gain (dBd) | Cable Loss (dB) | ERP (dBm) | Limit (dBm) | Result |
|----------|---------|--------------|-------------------|--------------------|-----------------|------------|-------------|--------|
| GSM 850 | Lowest | V | 15.31 | 19.33 | 2.52 | 29.97 | 38.45 | Pass |
| | | H | 15.17 | 19.33 | 2.52 | 29.83 | | |
| | Middle | V | 15.13 | 19.50 | 2.60 | 29.88 | 38.45 | Pass |
| | | H | 15.26 | 19.50 | 2.60 | 30.01 | | |
| | Highest | V | 15.31 | 19.94 | 2.71 | 30.39 | 38.45 | Pass |
| | | H | 15.24 | 19.94 | 2.71 | 30.32 | | |
| GPRS850 | Lowest | V | 15.11 | 19.33 | 2.52 | 29.77 | 38.45 | Pass |
| | | H | 15.20 | 19.33 | 2.52 | 29.86 | | |
| | Middle | V | 15.16 | 19.50 | 2.60 | 29.91 | 38.45 | Pass |
| | | H | 15.21 | 19.50 | 2.60 | 29.96 | | |
| | Highest | V | 15.27 | 19.94 | 2.71 | 30.35 | 38.45 | Pass |
| | | H | 15.20 | 19.94 | 2.71 | 30.28 | | |
| EUT mode | Channel | Antenna Pol. | S.G. output (dBm) | Antenna Gain (dBd) | Cable Loss (dB) | EIRP (dBm) | Limit (dBm) | Result |
| GSM1900 | Lowest | V | 16.44 | 15.68 | 1.65 | 30.47 | 33.00 | Pass |
| | | H | 16.38 | 15.68 | 1.65 | 30.41 | | |
| | Middle | V | 16.40 | 15.70 | 1.67 | 30.43 | 33.00 | Pass |
| | | H | 16.29 | 15.70 | 1.67 | 30.32 | | |
| | Highest | V | 16.06 | 15.70 | 1.71 | 30.05 | 33.00 | Pass |
| | | H | 16.37 | 15.70 | 1.71 | 30.36 | | |
| GPRS1900 | Lowest | V | 16.33 | 15.68 | 1.65 | 30.36 | 33.00 | Pass |
| | | H | 16.27 | 15.68 | 1.65 | 30.30 | | |
| | Middle | V | 16.30 | 15.70 | 1.67 | 30.33 | 33.00 | Pass |
| | | H | 16.28 | 15.70 | 1.67 | 30.31 | | |
| | Highest | V | 16.16 | 15.70 | 1.71 | 30.15 | 33.00 | Pass |
| | | H | 16.21 | 15.70 | 1.71 | 30.20 | | |



5.8. Radiated Out of Band Emissions

5.8.1. Limit

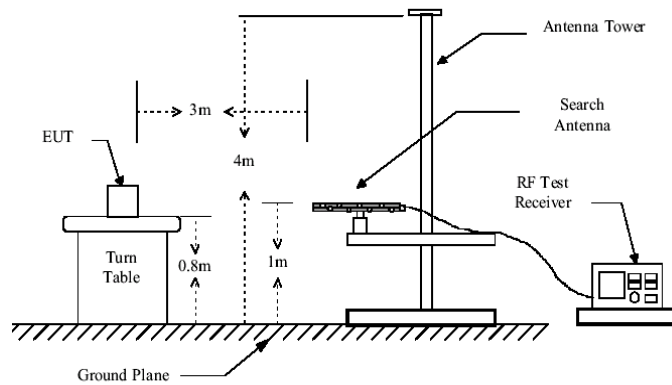
According to FCC section 22.917(a) and section 24.238(a), 27.53(g) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power

(P) by a factor of at least $43+10*\log(P)$ dB. This calculated to be -13dBm.

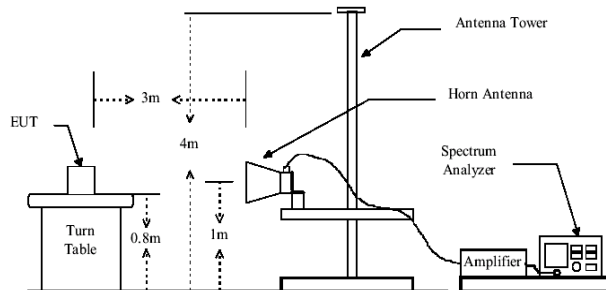
The spurious emission with frequency band 1900 according to FCC section 2.1057.

5.8.2. Test Setup

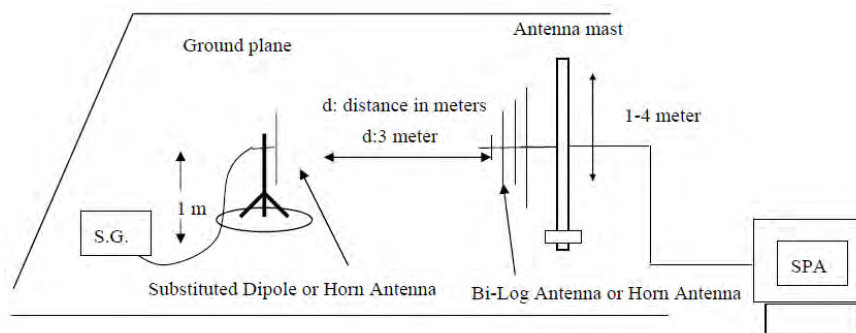
Below 1GHz



Above 1GHz



Substituted method:





5.8.3. Measurement Procedure

The EUT was placed on a non-conductive, The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. all test in Full-Anechoic Chamber.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$EIRP (Level) = S.G. \text{ output (dBm)} + \text{Antenna Gain(dBi)} - \text{Cable Loss (dB)}$

Note: Measurement Uncertainty: ± 3.6 dB.

The data show only the worst results, and the other results are very low and not shown in the report.

5.8.4. Test Result

| Band | Frequency (MHz) | Spurious Emission | | | | | Limit (dBm) | Result |
|----------------|-----------------|-------------------|-------------------|--------------------|-----------------|-------------|-------------|--------|
| | | Polarization | S.G. output (dBm) | Antenna Gain (dBi) | Cable Loss (dB) | Level (dBm) | | |
| GSM850 Lowest | 87.21 | Vertical | -74.37 | 3.35 | 0.38 | -71.40 | -13 | PASS |
| | 1648.40 | Vertical | -45.52 | 7.76 | 3.75 | -41.51 | | |
| | 2472.60 | Vertical | -46.61 | 9.84 | 4.94 | -41.71 | | |
| | 3296.80 | Vertical | -39.16 | 10.21 | 5.32 | -34.27 | | |
| | 4121.00 | Vertical | -42.49 | 11.36 | 6.02 | -37.15 | | |
| | 4945.20 | Vertical | -44.00 | 14.52 | 6.68 | -36.16 | | |
| GSM850 Middle | 88.39 | Vertical | -74.37 | 3.35 | 0.38 | -71.40 | -13 | PASS |
| | 1673.20 | Vertical | -46.82 | 7.77 | 3.76 | -42.81 | | |
| | 2509.80 | Vertical | -46.42 | 9.82 | 4.95 | -41.55 | | |
| | 3346.40 | Vertical | -42.11 | 10.27 | 5.36 | -37.20 | | |
| | 4183.00 | Vertical | -41.53 | 11.43 | 6.05 | -36.15 | | |
| | 5019.60 | Vertical | -45.42 | 14.58 | 6.68 | -37.52 | | |
| GSM850 Highest | 88.24 | Vertical | -74.33 | 3.35 | 0.38 | -71.36 | -13 | PASS |
| | 1697.60 | Vertical | -46.42 | 7.83 | 3.58 | -42.17 | | |
| | 2546.40 | Vertical | -40.97 | 9.92 | 5.07 | -36.12 | | |
| | 3395.20 | Vertical | -37.22 | 10.32 | 5.56 | -32.46 | | |
| | 4244.00 | Vertical | -43.84 | 11.39 | 6.18 | -38.63 | | |
| | 5092.80 | Vertical | -46.23 | 14.58 | 6.76 | -38.41 | | |

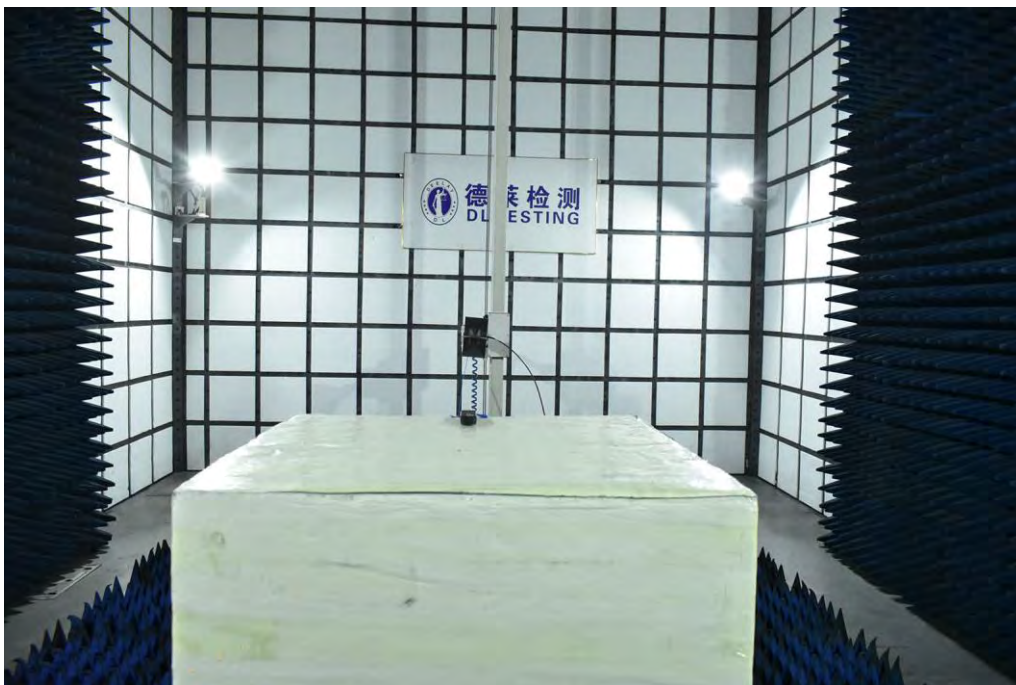
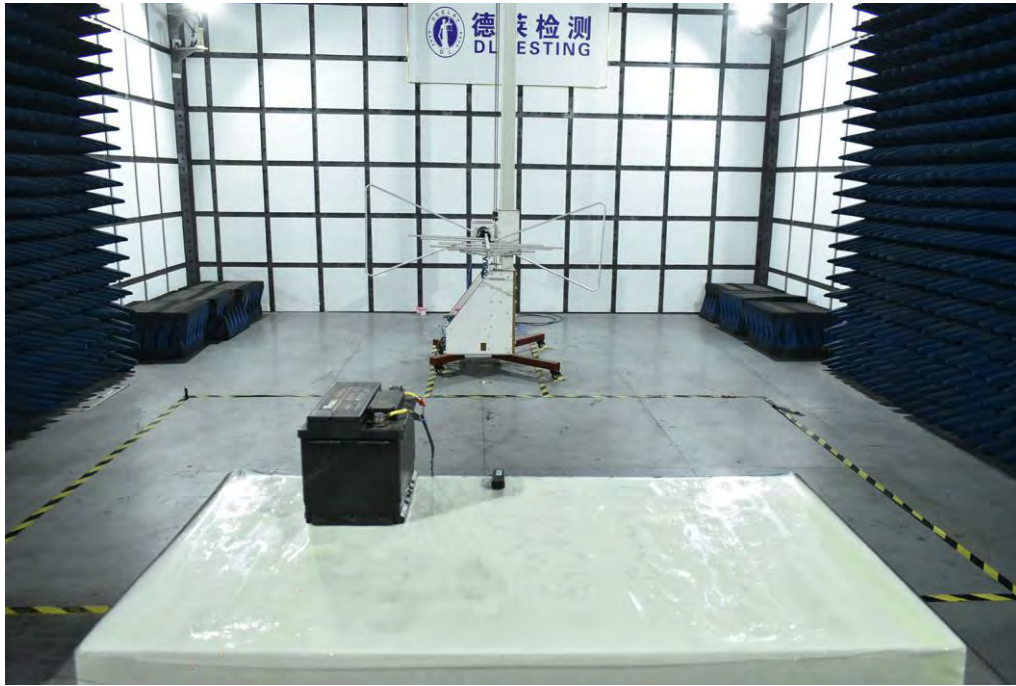


| Band | Frequency (MHz) | Spurious Emission | | | | | Limit (dBm) | Result |
|-----------------|-----------------|-------------------|-------------------|--------------------|-----------------|-------------|-------------|--------|
| | | Polarization | S.G. output (dBm) | Antenna Gain (dBi) | Cable Loss (dB) | Level (dBm) | | |
| GSM1900 Lowest | 87.21 | Vertical | -73.95 | 3.35 | 0.38 | -70.98 | -13 | PASS |
| | 3700.40 | Vertical | -45.26 | 10.34 | 5.45 | -40.37 | | |
| | 5550.60 | Vertical | -46.35 | 14.87 | 7.37 | -38.85 | | |
| | 7400.80 | Vertical | -38.94 | 16.12 | 8.24 | -31.06 | | |
| | 9251.00 | Vertical | -42.25 | 16.78 | 9.02 | -34.49 | | |
| | 11101.20 | Vertical | -43.75 | 17.54 | 10.56 | -36.77 | | |
| GSM1900 Middle | 88.39 | Vertical | -73.95 | 3.35 | 0.38 | -70.98 | -13 | PASS |
| | 3760.00 | Vertical | -46.55 | 10.65 | 5.49 | -41.39 | | |
| | 5640.00 | Vertical | -46.16 | 14.95 | 7.53 | -38.74 | | |
| | 7520.00 | Vertical | -41.87 | 16.35 | 8.45 | -33.97 | | |
| | 9400.00 | Vertical | -41.29 | 16.89 | 9.35 | -33.75 | | |
| | 11280.00 | Vertical | -45.16 | 17.73 | 10.65 | -38.08 | | |
| GSM1900 Highest | 88.24 | Vertical | -73.91 | 3.35 | 0.38 | -70.94 | -13 | PASS |
| | 3819.60 | Vertical | -46.16 | 10.67 | 5.76 | -41.25 | | |
| | 5729.40 | Vertical | -40.73 | 14.98 | 7.69 | -33.44 | | |
| | 7639.20 | Vertical | -37.00 | 16.67 | 8.66 | -28.99 | | |
| | 9549.00 | Vertical | -43.59 | 16.94 | 9.45 | -36.10 | | |
| | 11458.80 | Vertical | -45.97 | 17.89 | 10.44 | -38.52 | | |



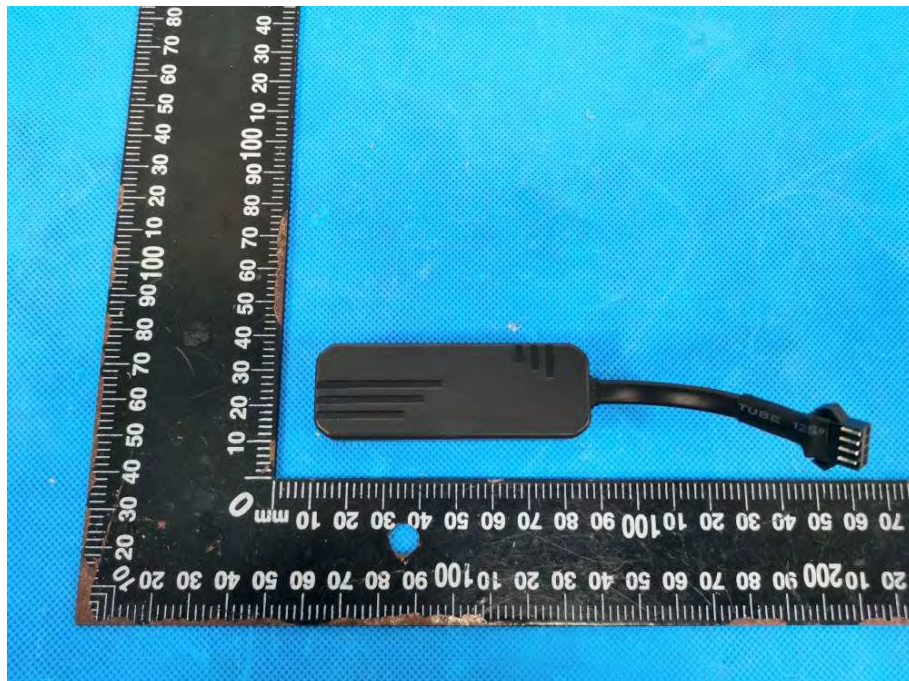
6. PHOTOGRAPHS OF TEST SET-UP

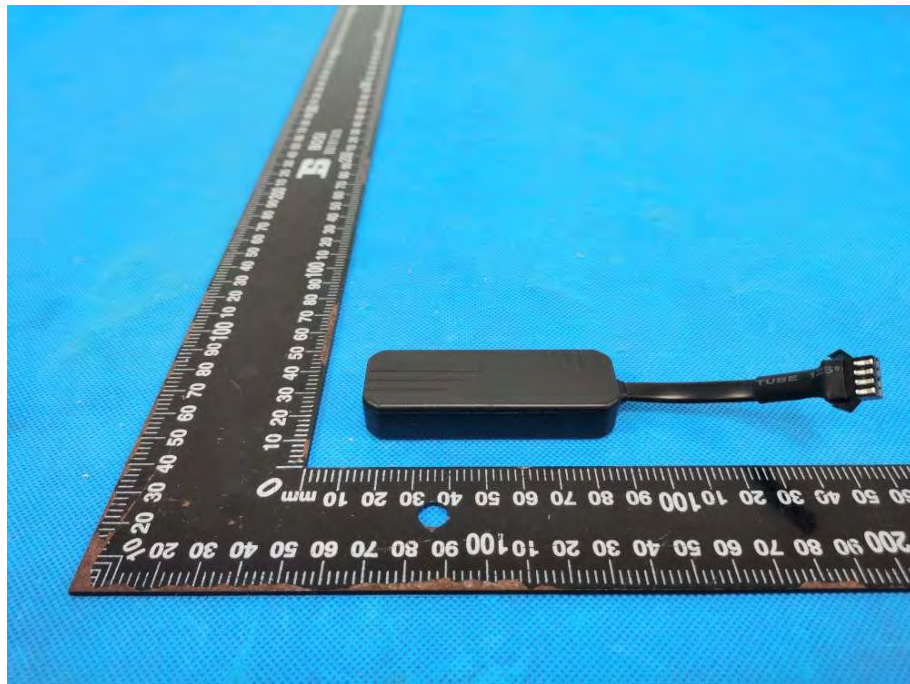
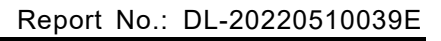
RE

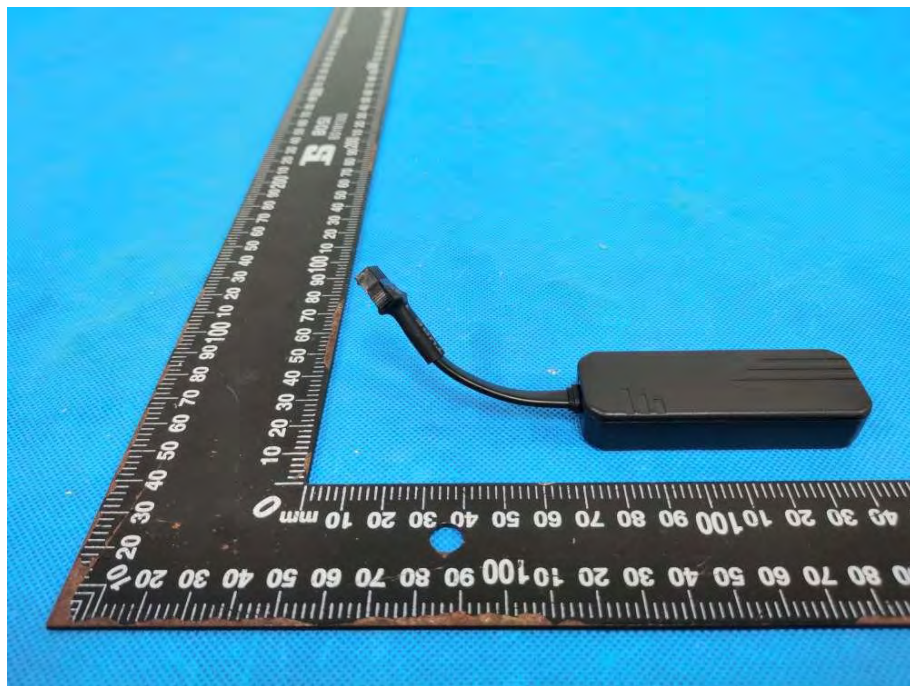
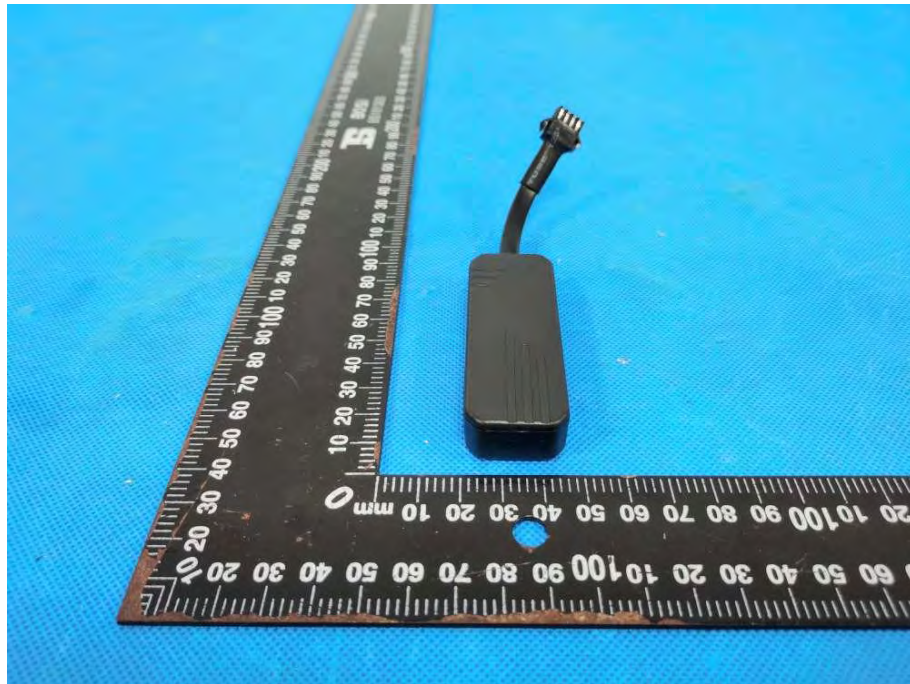


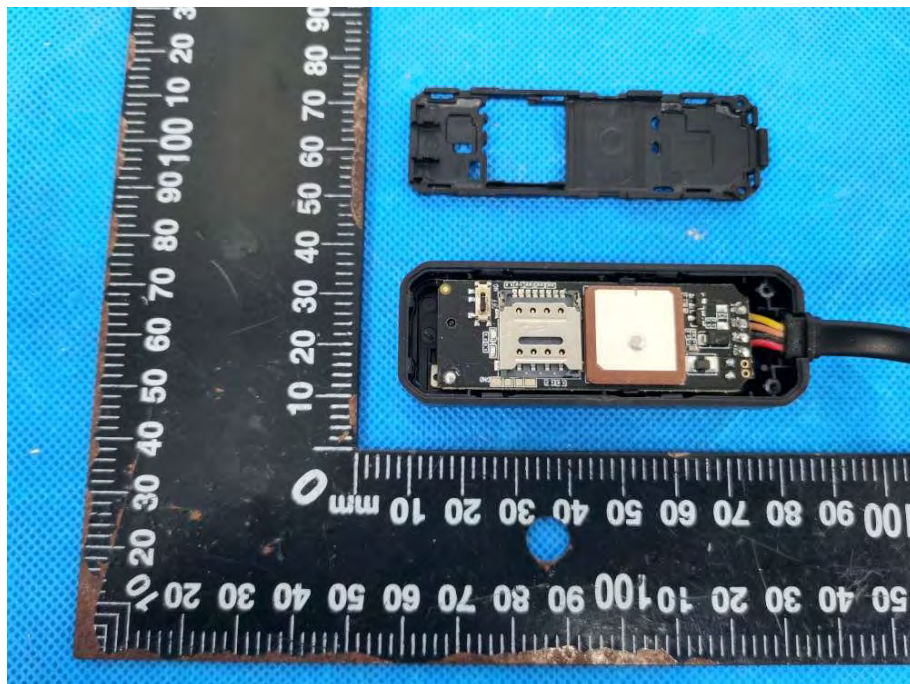
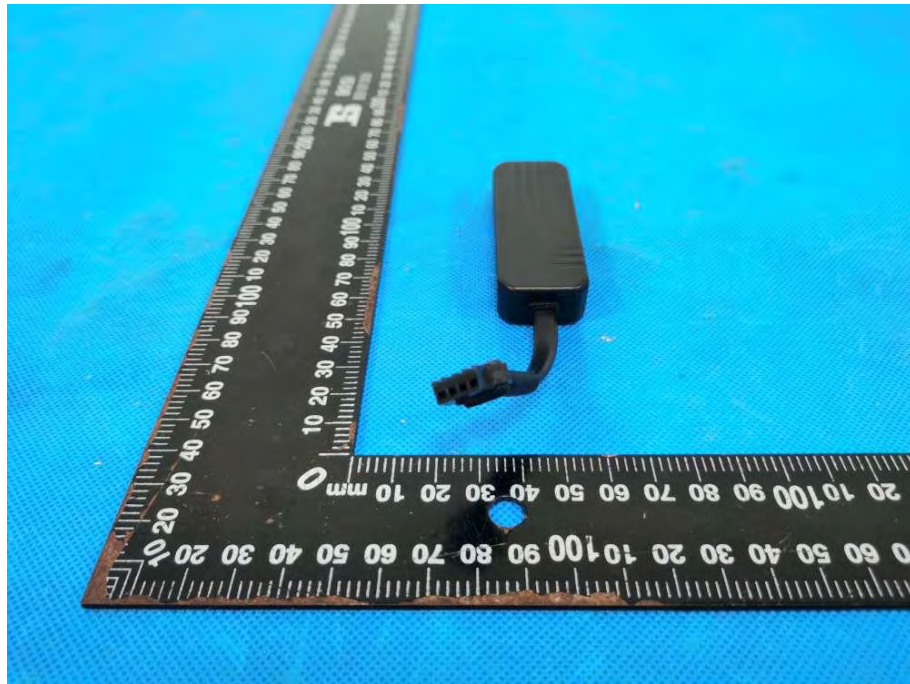


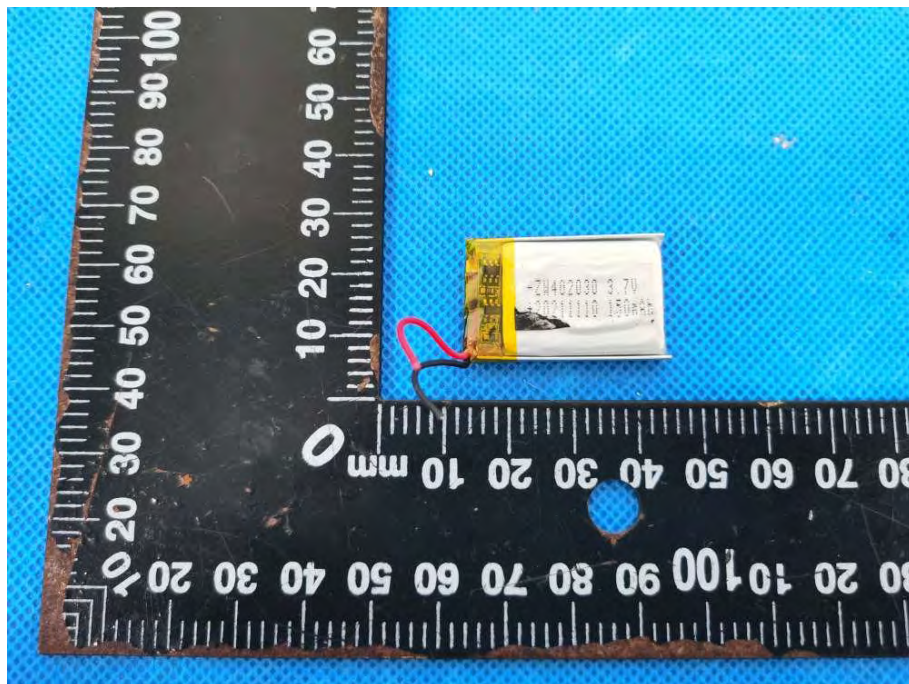
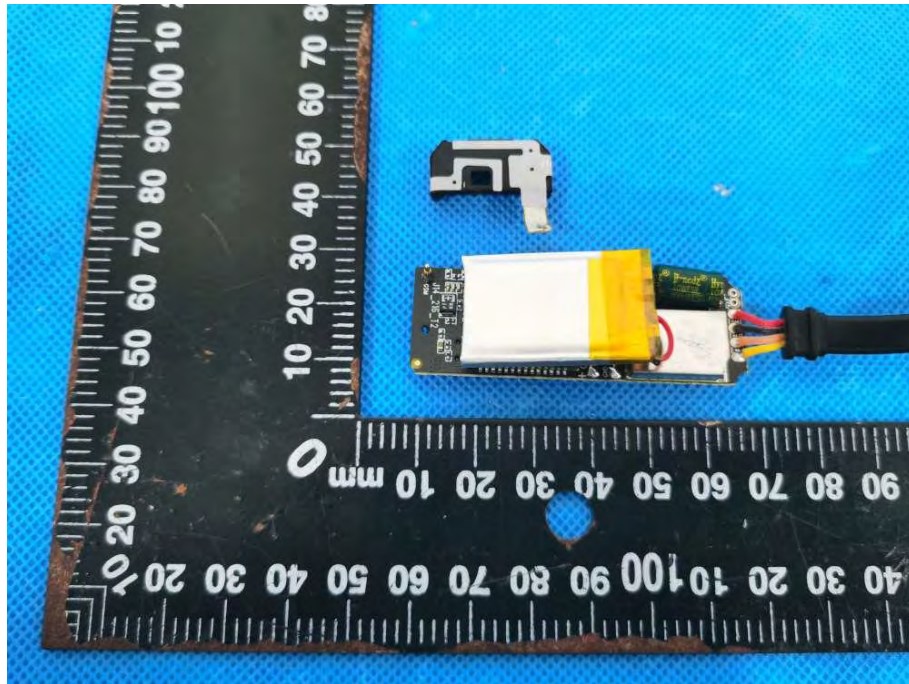
7. PHOTOGRAPHS OF THE EUT

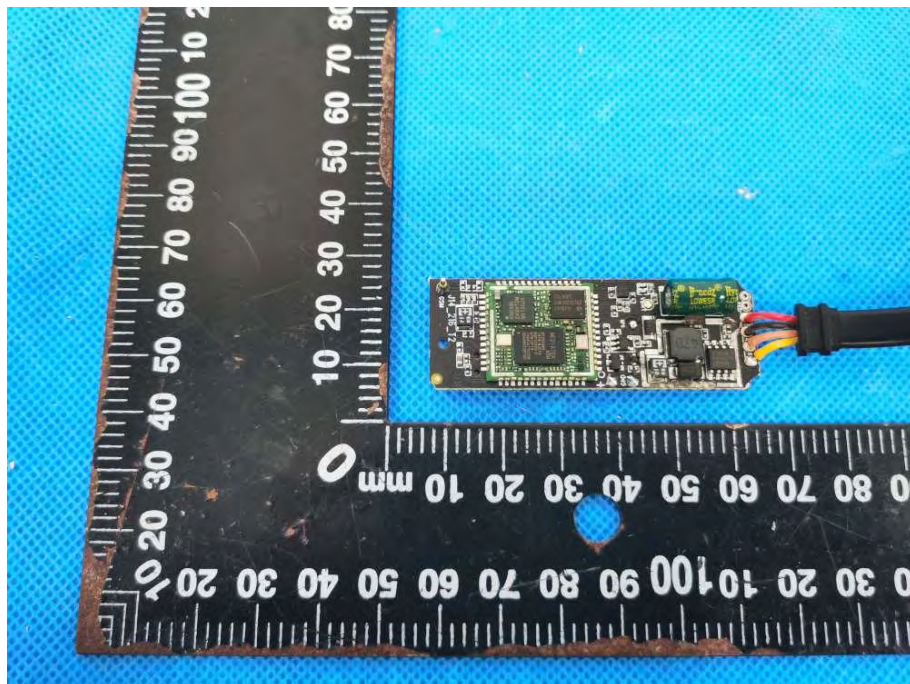
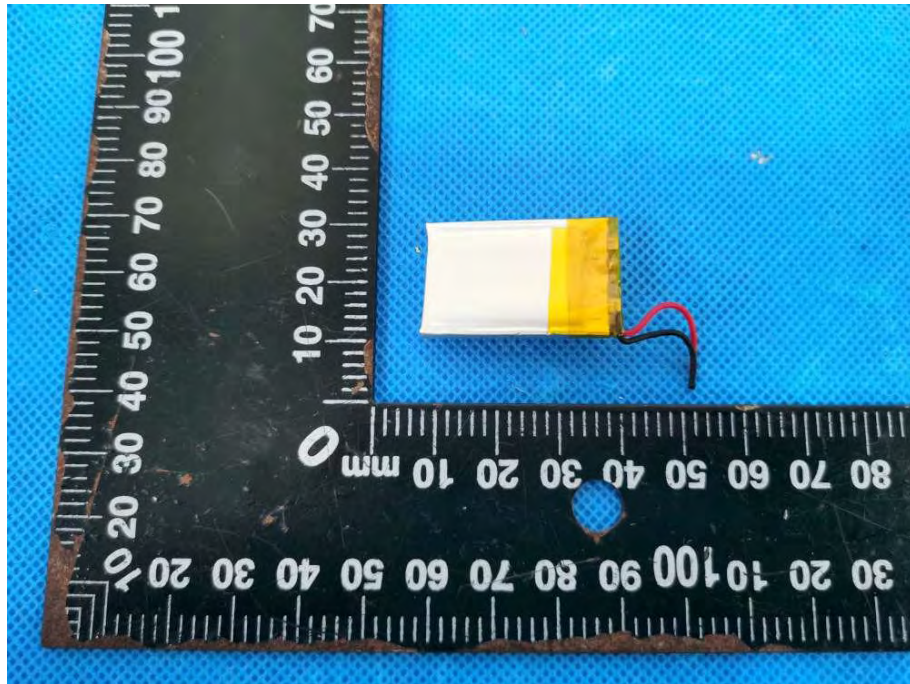


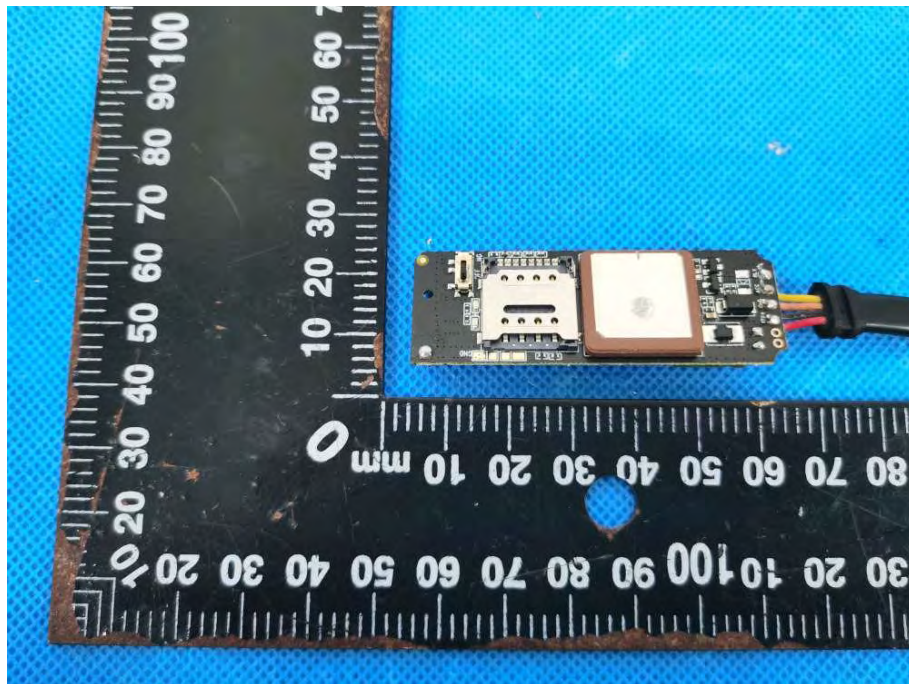












***** END OF REPORT *****