# FCC Test Report

| | | |
|---|---|---|
| **Application Purpose** | : | Original grant |
| **Applicant Name:** | : | Jiangxi Jade IOT-Sensing Technology Co., Ltd |
| **FCC ID** | : | 2ALRU-JD-GP20 |
| **Equipment Type** | : | Control Panel |
| **Model Name** | : | JD-GP20 |
| **Report Number** | : | FCC17030204A-2 |
| **Standard(S)** | : | FCC Part 22H & 24E Rules |
| **Date Of Receipt** | : | March 24, 2017 |
| **Date Of Issue** | : | April 24, 2017 |
| **Test By** | : | Dekun Liu<br>*(Daisy Qin)* |
| **Reviewed By** | : | Sol Qin<br>*(Sol Qin)* |
| **Authorized by** | : | <br>*(Michal Ling)* |
| **Prepared by** | : | **QTC Certification & Testing Co., Ltd.**<br>2nd Floor,B1 Buiding,Fengyeyuan Industrial Plant,,Liuxian 2st.Road,Xin'an Street,Bao'an District,,Shenzhen, 518000China.<br>**Registration Number: 588523** |

***Report Revise Record***

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | April 24, 2017 | Valid | Original Report |

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# 1. CERTIFICATION

| | |
|---|---|
| Applicant | Jiangxi Jade IOT-Sensing Technology Co., Ltd |
| Address | Jade Industrial Park,Gantong Street No.109,Ganzhou economic development district,Ganzhou City,Jiangxi Province,China. |
| Manufacturer | Jiangxi Jade IOT-Sensing Technology Co., Ltd |
| Address | Jade Industrial Park,Gantong Street No.109,Ganzhou economic development district,Ganzhou City,Jiangxi Province,China. |
| Equipment Type | Control Panel |
| Brand Name | JADE |
| Test Model | JD-GP20 |
| Hardware version: | V1.0 |
| Software version: | V1.0 |
| Series Model | N/A |
| Difference description | N/A |
| Deviation | None |
| Condition of Test Sample | Normal |

**We hereby certify that:**

All measurement facilities used to collect the measurement data are located at QTC Certification & Testing Co., Ltd.
Registration Number: 588523

The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2014 and TIA/EIA 603 D(2010). The sample tested as described in this report is in compliance with the FCC Rules Part 22H and 24E.
The test results of this report relate only to the tested sample identified in this report.

# 2. GENERAL INFORMATION

## 2.1.EUT Description

| | |
|---|---|
| **Equipment Type:** | Control Panel |
| **Hardware version:** | V1.0 |
| **Software version:** | V1.0 |
| **Frequency Bands:** | ☒GPRS 850 ☒PCS 1900 (U.S. Bands) |
| **Antenna Type:** | Internal Antenna |
| **Antenna gain:** | 3dBi |
| **Battery information:** | Lithium ion batteries : GN 628064<br>Capacity:1800mAh<br>Voltage: 7.4V |
| **Adapter Information:** | Adapter: LY012SPS-120100UH<br>Input: AC 100~240V 50/60Hz 0.35A<br>Output: DC 12V⎓1A |
| **Card(S):** | Card 2: UMTS Card Slot |
| **Max power:** | See note 6 |
| **GPRS Class:** | 12 |
| **Extreme Temp. Tolerance** | -10℃ to +55℃ |

# 3. TEST DESCRIPTION

## 3.1. Test Facility

The test site used to collect the radiated data is located at:
QTC Certification & Testing Co., Ltd.
Registration Number: 588523

EUT System Configuration:
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

**Fig. 3.2-1 Configuration of EUT System**

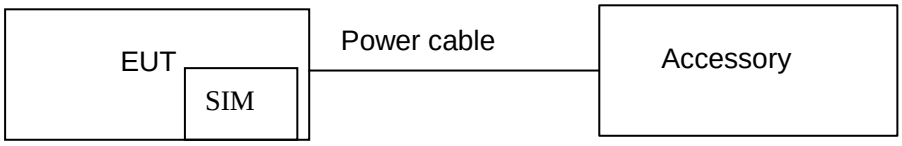



**Table 3.2-1 Equipment Used in EUT System**

| Item | Equipment | Model No. | ID or Specification | Note |
|---|---|---|---|---|
| 1 | Control Panel | JD-GP20 | FCC ID: 2ALRU-JD-GP20 | EUT |
| 2 | DC SOURCE | LY012SPS-120100UH | Series: 2008006875 | Power supply |

Note: All the accessories have been used during the test. The following "EUT" in setup diagram means EUT system.

## 3.2.Description Of Test Channels And Test Modes

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on following frequency band(s).

**Test channels:**

| Band | Channel | | Frequency (MHz) |
|---|---|---|---|
| GPRS850 | Low | 128 | 824.2 |
| | Middle | 190 | 836.6 |
| | High | 251 | 848.8 |

| Band | Channel | | Frequency (MHz) |
|---|---|---|---|
| PCS1900 | Low | 512 | 1850.2 |
| | Middle | 661 | 1880 |
| | High | 810 | 1909.8 |

The worst condition was recorded in the test report if no other modes test data.

## 3.3.Equipment Modifications

Not available for this EUT intended for grant.

# 4. SUMMARY OF TEST REQUIREMENTS AND RESULTS

**PCS 1900:**

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §24.232(c) | EIRP ≤ 2W(33dBm) | Pass |
| Bandwidth | §2.1049 §24.238(a) | OBW: No limit. EBW: No limit. | Pass |
| Band Edges | §2.1051, §24.238(a) | -13dBm | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238(a) | -13dBm | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238(a) | -13dBm | Pass |
| Frequency Stability | §2.1055, §24.235 | the fundamental emission stays within the authorized frequency block. | Pass |
| Peak to average ratio | §24.232(d) | <13dB | Pass |

**GPRS850**

| Test Item | FCC Rule No. | Requirements | Judgement |
|---|---|---|---|
| Effective (Isotropic) Radiated Power | §2.1046, §2.913(a) | EIRP ≤ 7W(38.5dBm) | Pass |
| Occupied Bandwidth | §2.1049 | OBW: No limit. | Pass |
| Emission Bandwidth | 22.917(b) | EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §22.917(a)(b) | KDB 971 168 D02 971168 D02 Misc OOBE License Digital Systems v01 &27.53(m) for detail the limit is upon different OBW | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | -13dBm | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | -13dBm | Pass |
| Frequency Stability | §2.1055, §22.355 | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass |

# 5. MEASUREMENT INSTRUMENTS

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | Calibration Date | Calibration Due. |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 100005 | 08/19/2016 | 08/18/2017 |
| ESPI Test Receiver | ROHDE&SCHWARZ | ESPI | 101139 | 08/19/2016 | 08/18/2017 |
| LISN | AFJ | LS16 | 16010222119 | 08/19/2016 | 08/18/2017 |
| LISN(EUT) | Mestec | AN3016 | 04/10040 | 08/19/2016 | 08/18/2017 |
| Universal Radio Communication Tester | R&S | CMU 200 | 1100.0008.02 | 08/19/2016 | 08/18/2017 |
| Coaxial cable | Megalon | LMR400 | N/A | 08/12/2016 | 08/11/2017 |
| GPIB cable | Megalon | GPIB | N/A | 08/12/2016 | 08/11/2017 |
| Spectrum Analyzer | R&S | FSU | 100114 | 08/19/2016 | 08/18/2017 |
| Pre Amplifier | H.P. | HP8447E | 2945A02715 | 10/13/2016 | 10/12/2017 |
| Pre-Amplifier | CDSI | PAP-1G18-38 | -- | 10/13/2016 | 10/12/2017 |
| Bi-log Antenna | SUNOL Sciences | JB3 | A021907 | 09/13/2016 | 09/12/2017 |
| 9*6*6 Anechoic | -- | -- | -- | 08/21/2016 | 08/20/2017 |
| Horn Antenna | COMPLIANCE ENGINEERING | CE18000 | -- | 09/13/2016 | 09/12/2017 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-631 | 08/23/2016 | 08/22/2017 |
| Cable | TIME MICROWAVE | LMR-400 | N-TYPE04 | 04/25/2016 | 04/24/2017 |
| System-Controller | CCS | N/A | N/A | N.C.R | N.C.R |
| Turn Table | CCS | N/A | N/A | N.C.R | N.C.R |
| Antenna Tower | CCS | N/A | N/A | N.C.R | N.C.R |
| RF cable | Murata | MXHQ87WA3000 | - | 08/21/2016 | 08/20/2017 |
| Loop Antenna | EMCO | 6502 | 00042960 | 08/22/2016 | 08/21/2017 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 1123 | 08/19/2016 | 08/18/2017 |
| Three-way connector | Weinschel | 1506A | A1213 | 08/19/2016 | 08/18/2017 |
| Attenuator | MCL | BW-W40W5+ | 1306 | 08/19/2016 | 08/18/2017 |
| Signal generator | Agilent | 8920B | VS36141817 | 08/19/2016 | 08/18/2017 |
| Power amplifier | rflight | NTWPA-00810150100E | 13103205 | 08/19/2016 | 08/18/2017 |
| Power amplifier | rflight | NTWPA-1060040E | 13104214 | 08/19/2016 | 08/18/2017 |
| Bi-log Antenna | A.H. Systems Inc. | SAS-522-3 | 1326 | 08/21/2016 | 08/20/2017 |

# 6. EFFECTIVE (ISOTROPIC) RADIATED POWER

Test limit:

According to §22.913, The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to§24.232, Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

See section 4.

Test procedure:

1. The setup of EUT is according with per TIA/EIA Standard 603 D:2010 or KDB971168 D01 v02r02.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

5. ERP/EIRP = PMeas + GT − LC

where:

ERP/EIRP = effective or equivalent radiated power

PMeas = measured transmitter output power from SG

GT = gain of the substitution antenna

LC = cable loss between SG and substitution antenna.

## Measurement Result

| Conducted Output Power Limits for GPRS 850 band | | |
|---|---|---|
| **Mode** | **Nominal Peak Power** | **Tolerance(dB)** |
| **GPRS850** | 30 dBm (2W) | +/- 1 |
| **Conducted Output Power Limits for PCS1900 band** | | |
| **Mode** | **Nominal Peak Power** | **Tolerance(dB)** |
| **PCS1900** | 27 dBm (1W) | +/- 1 |

**GPRS 850:**

**Card 1:**

| Mode | Frequency (MHz) | Peak Power (dBm) | Avg. Burst Power (dBm) | PAPR (dB) | Duty cycle Factor(dB) | Frame Power(dBm) |
|---|---|---|---|---|---|---|
| GPRS850 | 824.2 | 30.12 | **29.85** | 0.27 | -9 | 20.85 |
| | 836.6 | 30.28 | 29.72 | 0.56 | -9 | 20.72 |
| | 848.8 | **30.38** | 29.68 | 0.70 | -9 | 20.68 |

**PCS 1900:**

**Card 1:**

| Mode | Frequency (MHz) | Peak Power (dBm) | Avg. Burst Power (dBm) | PAPR (dB) | Duty cycle Factor(dB) | Frame Power (dBm) |
|---|---|---|---|---|---|---|
| GPRS1900 | 1850.2 | 27.55 | **26.98** | 0.57 | -9 | 17.98 |
| | 1880 | 27.76 | 26.83 | 0.93 | -9 | 17.83 |
| | 1909.8 | **27.81** | 26.96 | 0.85 | -9 | 17.96 |

| Radiated Power (ERP) for GSM 850 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak ERP (dBm) | Polarization Of Max. ERP | |
| GPRS850 | 824.2 | 29.30 | Horizontal | Pass |
| | 836.6 | 29.38 | Horizontal | Pass |
| | 848.8 | 29.36 | Horizontal | Pass |

| Radiated Power (E.I.R.P) for PCS 1900 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak E.I.R.P.(dBm) | Polarization Of Max. E.I.R.P. | |
| GPRS1900 | 1850.2 | 26.27 | Horizontal | Pass |
| | 1880.0 | 26.35 | Horizontal | Pass |
| | 1909.8 | 26.26 | Horizontal | Pass |

# 7. SPURIOUS EMISSION (Conducted and Radiated)

## 7.1. Measurement Result (Pre-measurement)

**GPRS850:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 128 | 824.2 | Pass |
| Middle Range | 0.2 | 190 | 836.6 | Pass |
| High Range | 0.2 | 251 | 848.8 | Pass |

**PCS 1900：**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 512 | 1850.2 | Pass |
| Middle Range | 0.2 | 661 | 1880.0 | Pass |
| High Range | 0.2 | 810 | 1909.8 | Pass |

Test Plot(s)

## 7.1.1 Conducted method

Test limit:

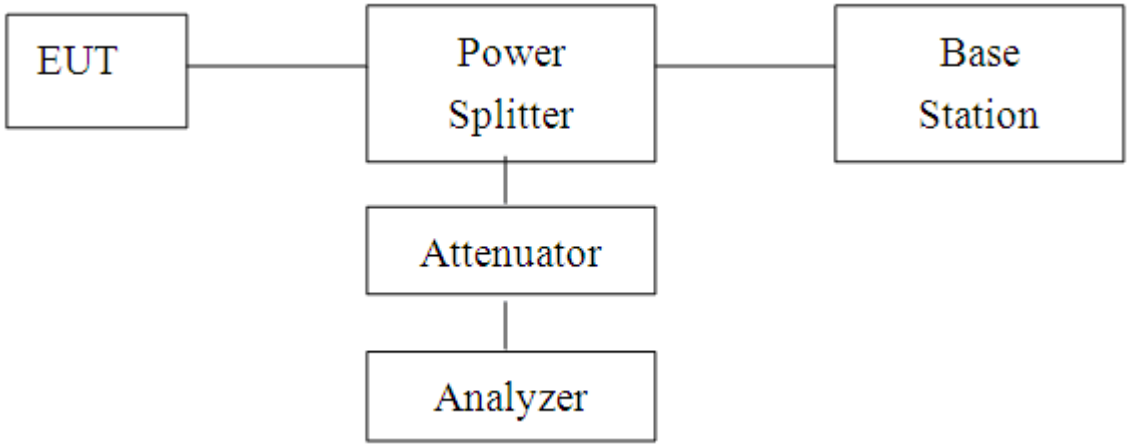
The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading ‘emission limits’) normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.

Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

Test procedure:

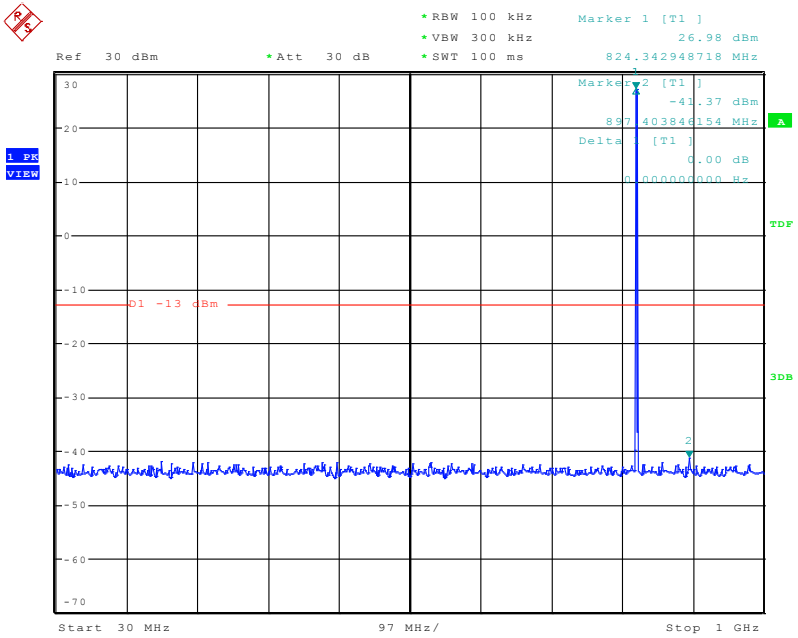
The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

Conducted Emission Test-Up:



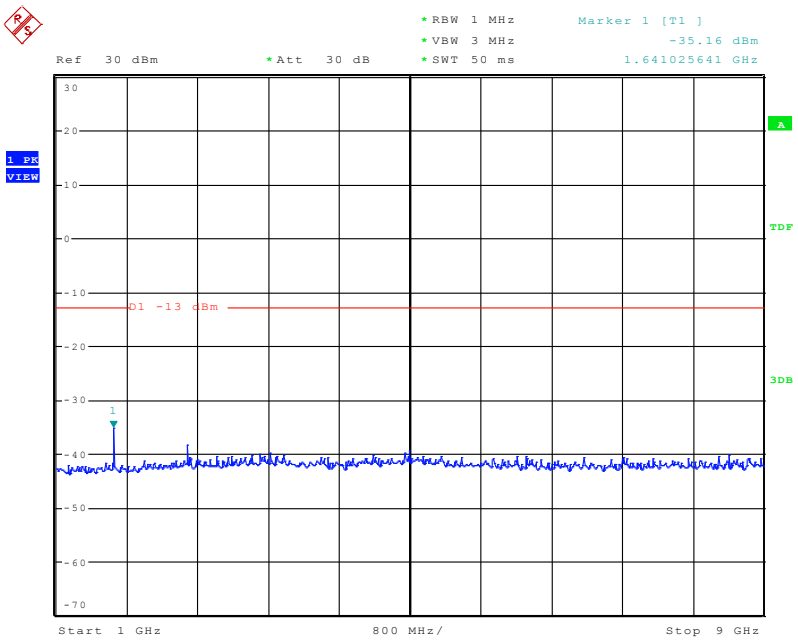
## CONDUCTED EMISSION IN GPRS 850 BAND

### Conducted Emission Transmitting Mode CH 128 30MHz – 1GHz



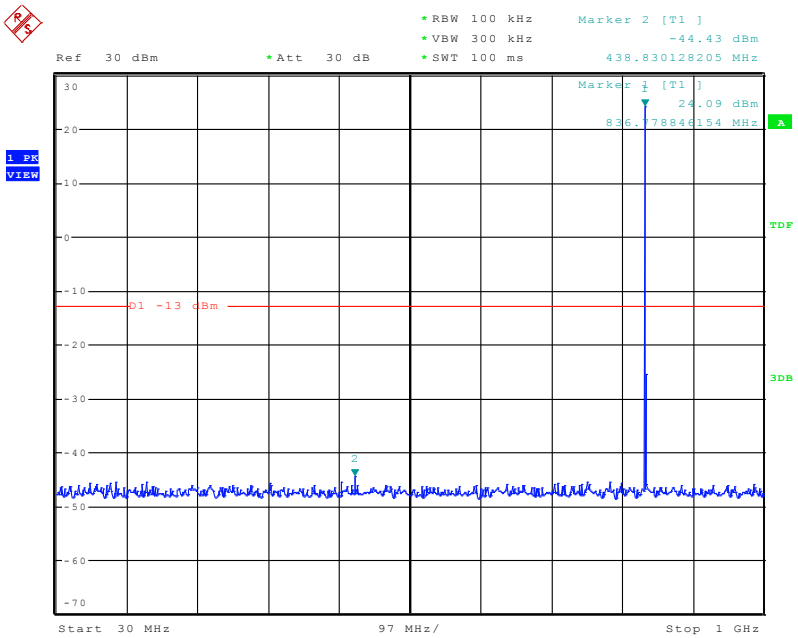

Date: 14.APR.2017 17:03:25

### Conducted Emission Transmitting Mode CH 128 1GHz – 9GHz



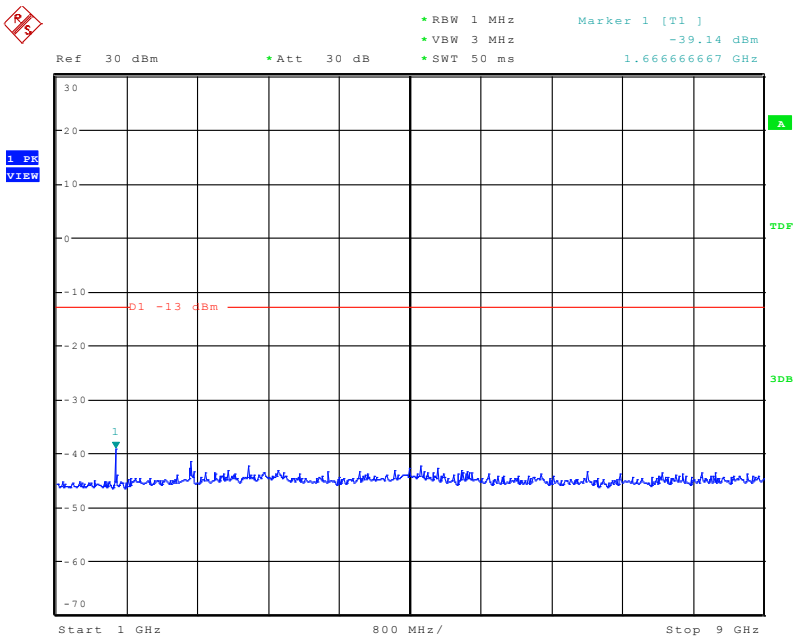

Date: 14.APR.2017 17:04:36

## Conducted Emission Transmitting Mode CH 190 30MHz – 1GHz



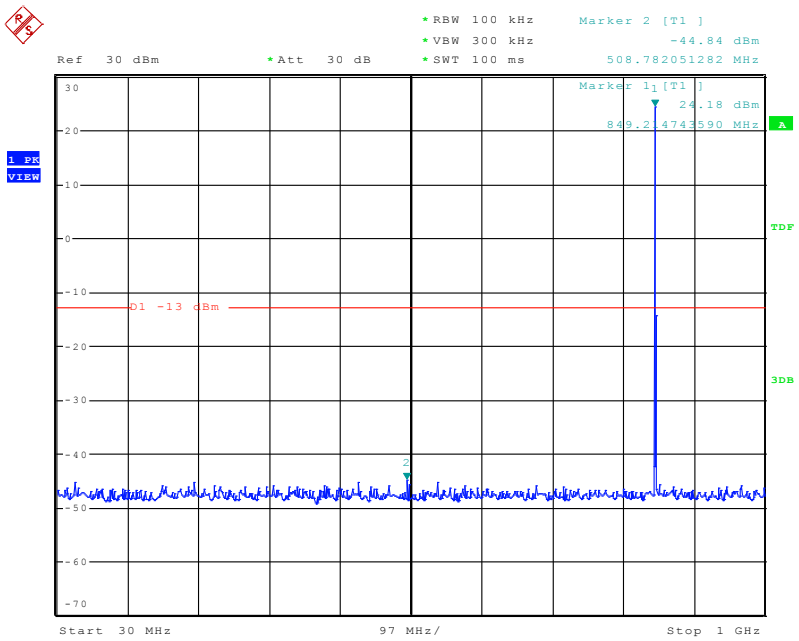

Date: 14.APR.2017 17:06:11

## Conducted Emission Transmitting Mode CH 190 1GHz – 9GHz



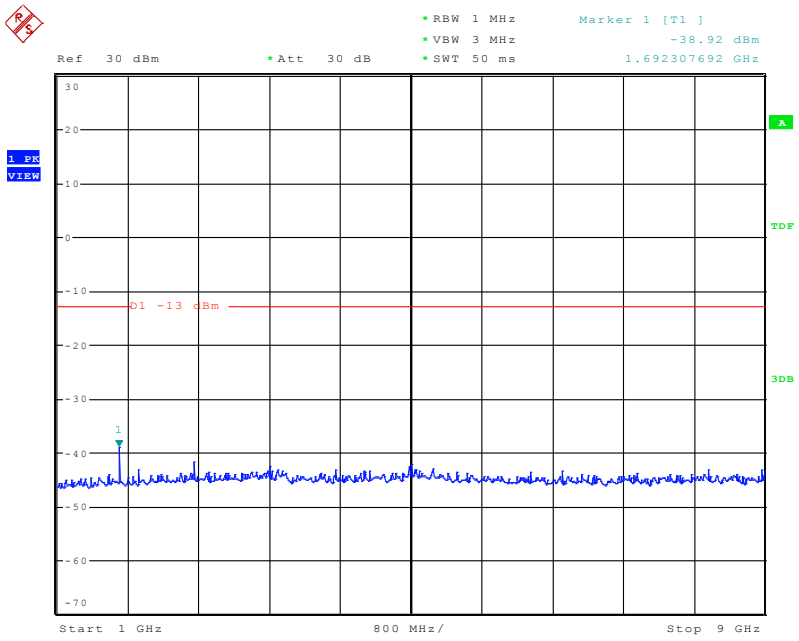

Date: 14.APR.2017 17:06:52

## Conducted Emission Transmitting Mode CH 251 30MHz – 1GHz




Date: 14.APR.2017 17:08:14

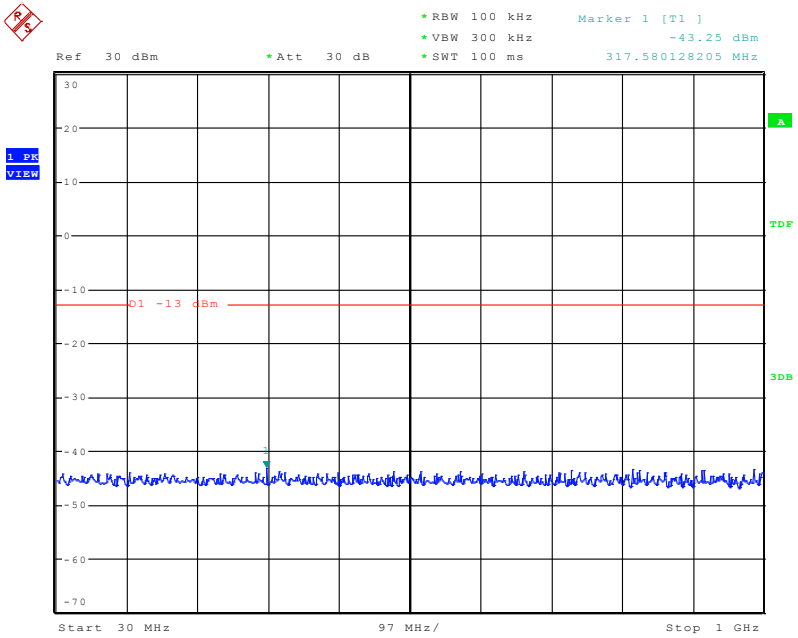
Conducted Emission Transmitting Mode CH 251 1GHz – 9GHz




Date: 14.APR.2017 17:09:06

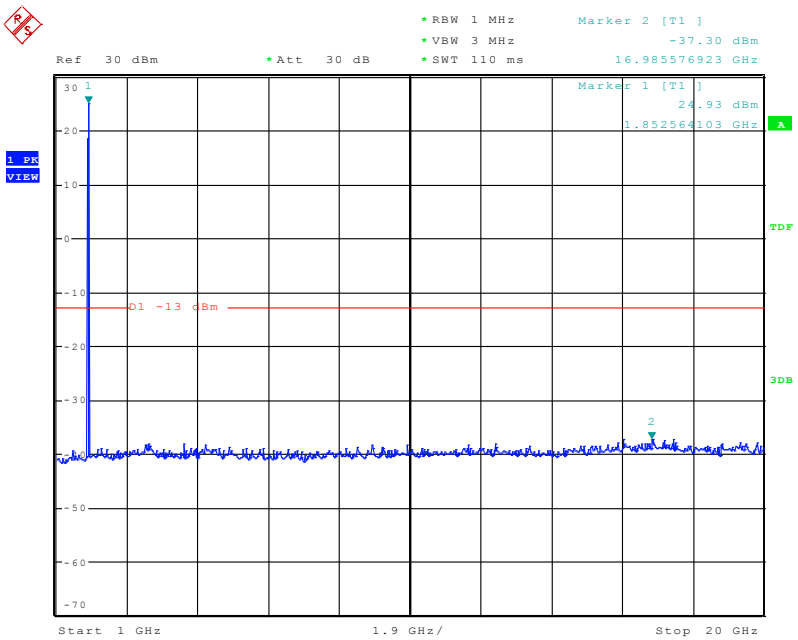
## CONDUCTED EMISSION IN PCS1900 BAND

### Conducted Emission Transmitting Mode CH 512 30MHz – 1GHz



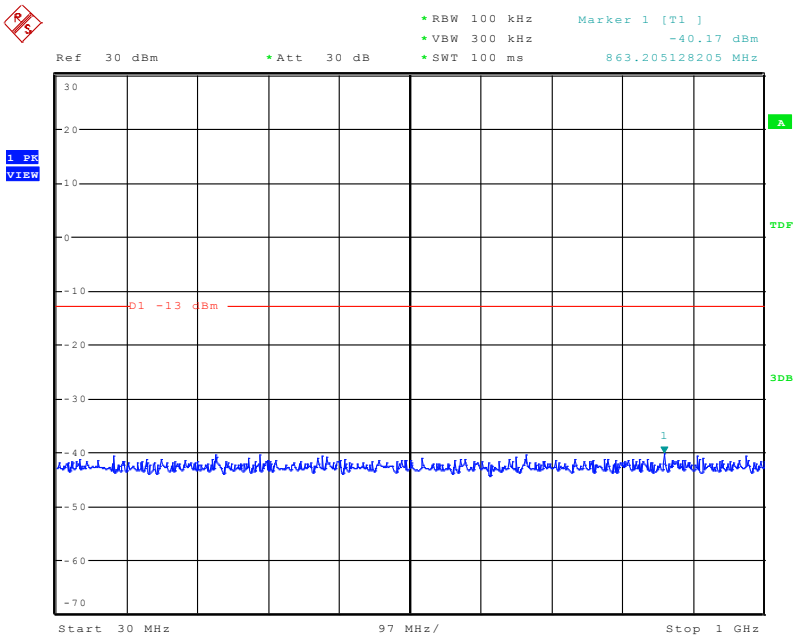

Date: 14.APR.2017 16:29:05

### Conducted Emission Transmitting Mode CH 512 1GHz – 20GHz



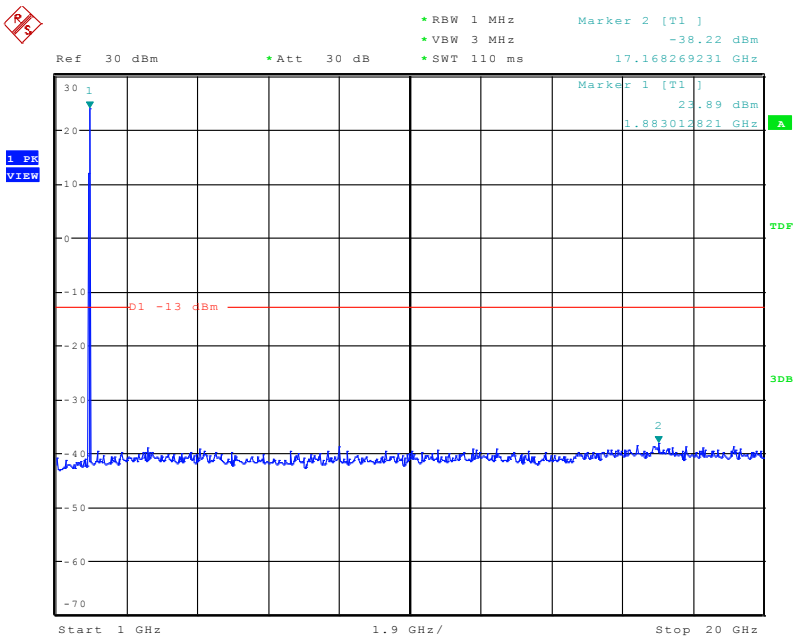

Date: 14.APR.2017 16:33:16

## Conducted Emission Transmitting Mode CH 661 30MHz – 1GHz



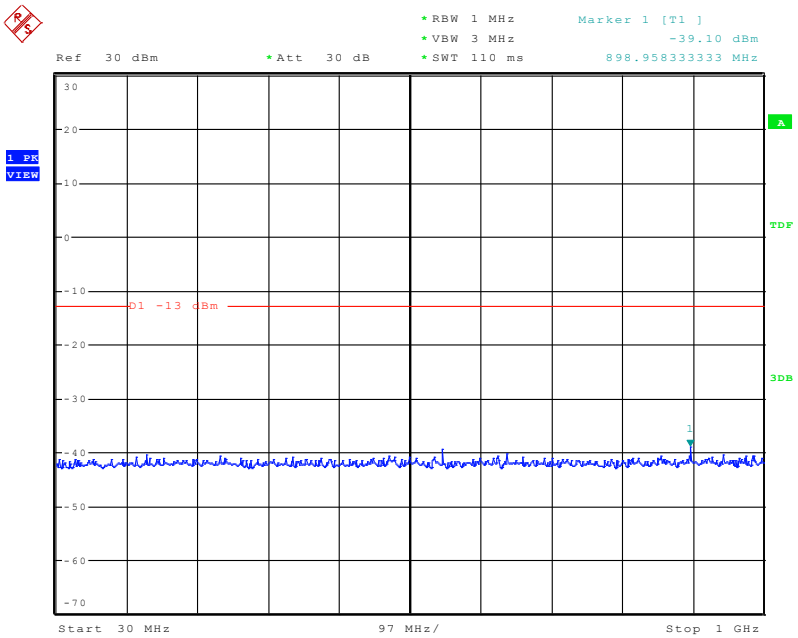

Date: 14.APR.2017 16:34:16

## Conducted Emission Transmitting Mode CH 661 1GHz – 20GHz



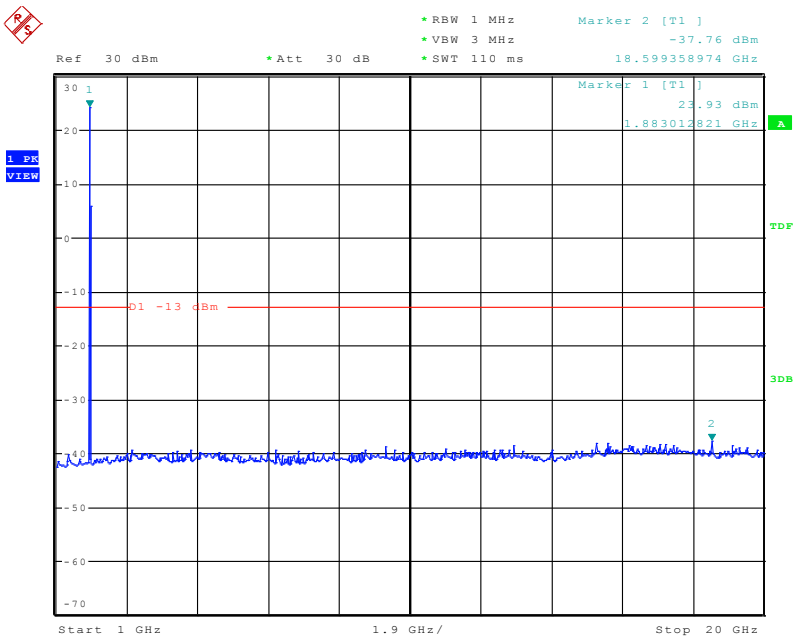

Date: 14.APR.2017 16:36:31

## Conducted Emission Transmitting Mode CH 810 30MHz – 1GHz




Date: 14.APR.2017 16:37:06

## Conducted Emission Transmitting Mode CH 810 1GHz – 20GHz

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## 7.2. Radiated method

Test limit:

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. In some rule parts, the unwanted emission limits are specified by an emission mask that defines the applicable limit as a function of the frequency range relative to the authorized frequency block.

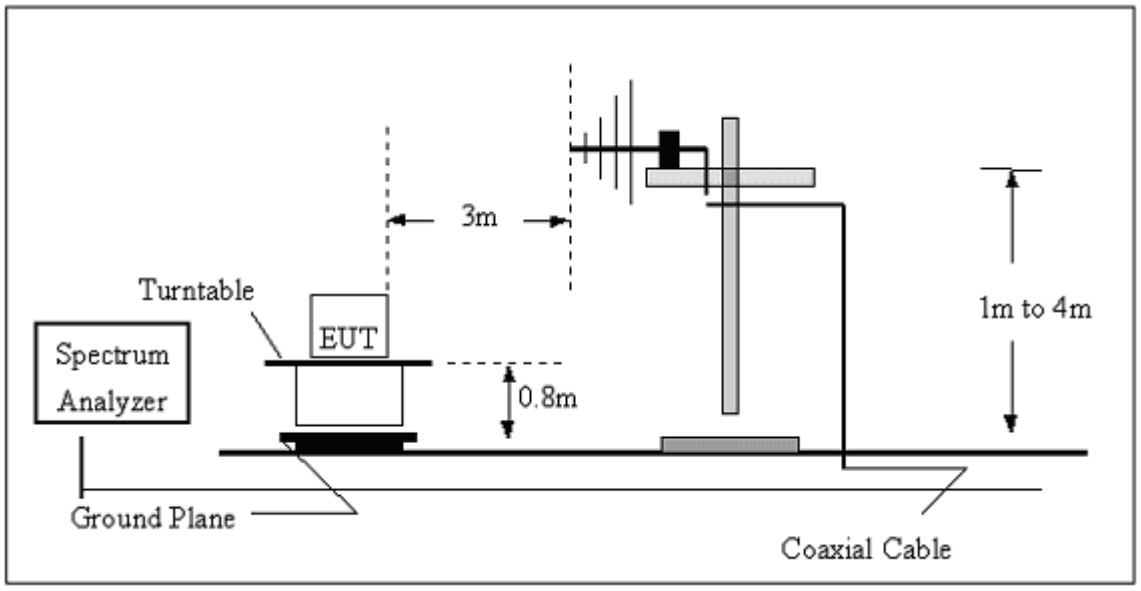
Typically, unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least X + 10log(P) dB, where P represents the transmitter power expressed in watts and X is a specified scalar value (e.g., 43). This specification can be interpreted in one of two equivalent ways. First, the required attenuation can be construed to be relative to the mean carrier power, with the resultant of the equation X + 10log(P) being expressed in dBc (dB relative to the maximum carrier power). Alternatively, the specification can be interpreted as an absolute limit when the specified attenuation is actually subtracted from the maximum permissible transmitter power [i.e., 10log(P) – {X + 10log(P)}], resulting in an absolute level of -X dBW [or (-X + 30) dBm]. See section 4.

Test procedure:

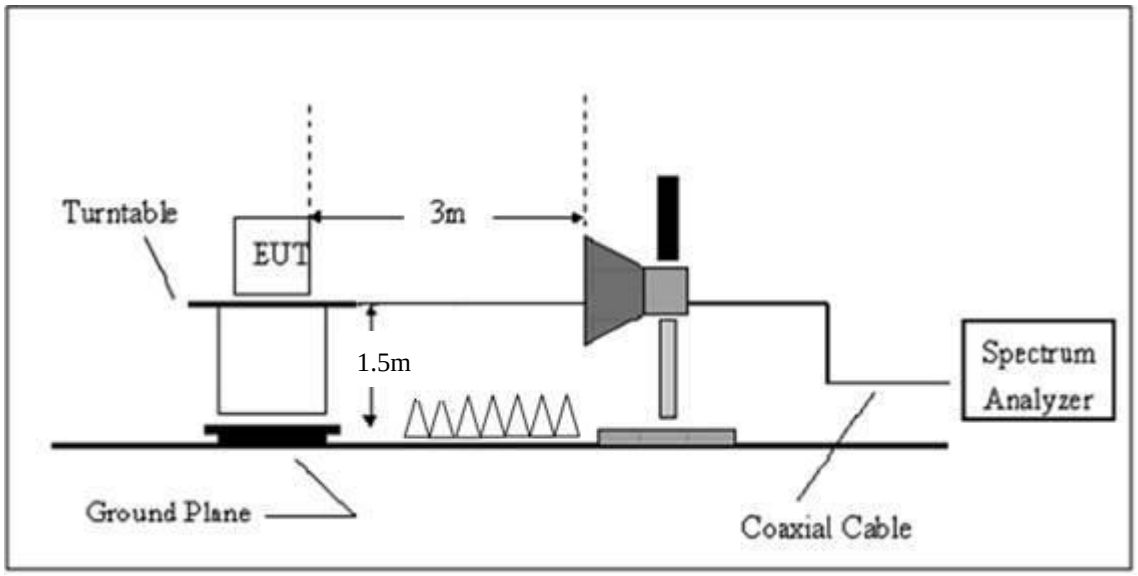
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The resolution bandwidth of the spectrum analyzer was set at 100 kHz below 1 GHz and 1 MHz above 1 GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonics.

Test setup:

（A）Radiated Emission Test-Up Frequency 30MHz~1GHz



（B）Radiated Emission Test-Up Frequency Above 1GHz




**Note:**

***1****, Below 30MHz no Spurious found.*

*2, UE is poistioned at 3 axis at the pre-scan stage, and only the measurement of the worst case is reported in this part.*

**List of final test modes:**

**GSM850:**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 128 | 824.2 | Pass |
| 2 | 190 | 836.6 | Pass |
| 3 | 251 | 848.8 | Pass |

**PCS1900**

| Mode | UL Channel | Frequency | Judgement |
|---|---|---|---|
| 1 | 512 | 1850.2 | Pass |
| 2 | 661 | 1880 | Pass |
| 3 | 810 | 1909.8 | Pass |

## Measurement Result

**GPRS850:**

| The Worst Test Results for Channel 128/824.2MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 127.97 | -30.12 | 1.42 | -31.54 | -13 | Horizontal |
| 222.06 | -31.78 | -2.48 | -29.30 | -13 | Vertical |
| 652.74 | -36.83 | 3.26 | -40.09 | -13 | Horizontal |
| 888.45 | -33.83 | 6.68 | -40.51 | -13 | Vertical |

| The Worst Test Results for Channel 190/836.6MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 1673.2 | -35.12 | 1.42 | -36.54 | -13 | Horizontal |
| 1673.2 | -31.47 | -2.48 | -28.99 | -13 | Vertical |
| 2509.8 | -36.16 | 3.26 | -39.42 | -13 | Horizontal |
| 2509.8 | -33.02 | 6.68 | -39.70 | -13 | Vertical |

| The Worst Test Results for Channel 251/848.8MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 1697.6 | -30.18 | 1.42 | -31.60 | -13 | Horizontal |
| 2546.4 | -36.95 | -2.48 | -34.47 | -13 | Vertical |
| 3395.2 | -31.46 | 3.26 | -34.72 | -13 | Horizontal |
| 4244 | -33.88 | 6.68 | -40.56 | -13 | Vertical |

**PCS1900:**

| The Worst Test Results for Channel 512/1850.2MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 90.14 | -32.98 | -1.98 | -31.00 | -13 | Horizontal |
| 321.97 | -31.02 | -1.61 | -29.41 | -13 | Vertical |
| 542.15 | -29.61 | 1.97 | -31.58 | -13 | Horizontal |
| 768.17 | -28.82 | -2.26 | -26.56 | -13 | Vertical |

| The Worst Test Results for Channel 661/1880MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 1673.2 | -32.54 | -1.98 | -30.56 | -13 | Horizontal |
| 1673.2 | -30.00 | -1.61 | -28.39 | -13 | Vertical |
| 2509.8 | -31.96 | 1.97 | -33.93 | -13 | Horizontal |
| 2509.8 | -33.55 | -2.26 | -31.29 | -13 | Vertical |

| The Worst Test Results for Channel 810/1909.8MHz | | | | | |
|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
| 3819.6 | -34.16 | -1.98 | -32.18 | -13 | Horizontal |
| 5729.4 | -31.44 | -1.61 | -29.83 | -13 | Vertical |
| 7639.2 | -32.25 | 1.97 | -34.22 | -13 | Horizontal |
| 9549 | -33.71 | -2.26 | -31.45 | -13 | Vertical |

**Note:** Below 30MHZ no Spurious found.

# 8.FREQUENCY STABILITY

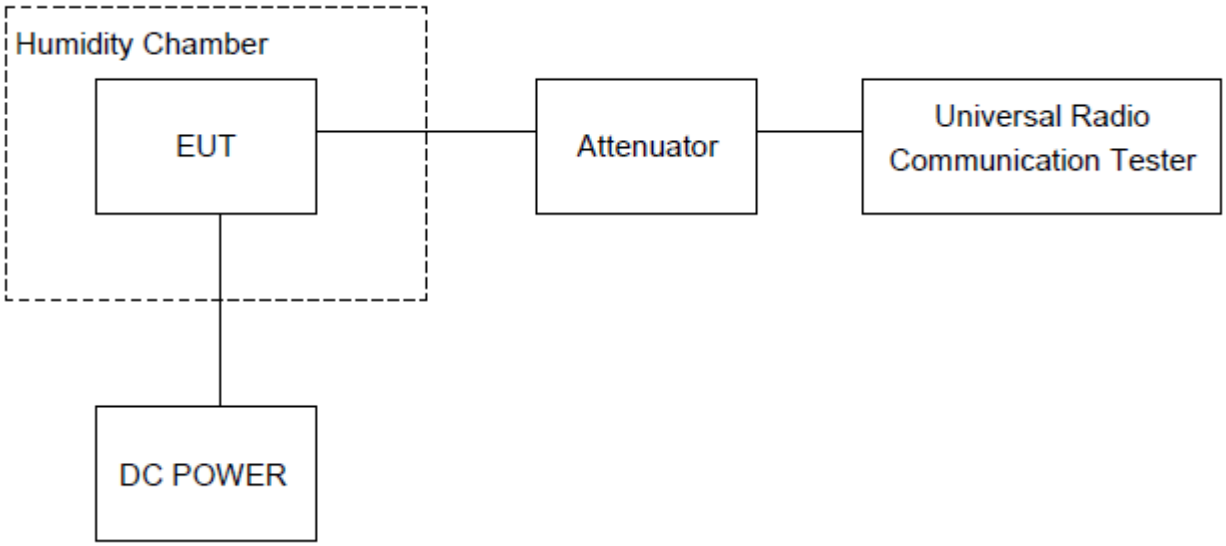
Test limit:

The frequency stability of the transmitter shall be measured while varying the ambient temperatures and supply voltages over the ranges specified in §2.1055. The specific frequency stability limits are provided in the relevant rules section(s). see section 4.

Test procedure:

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

Test setup:



**Measurement Result (WORST)**

**Frequency Error against Voltage for GPRS 850 band (Mid channel)**

| Voltage(V) | Frequency error(Hz) | Frequency error (ppm) |
|---|---|---|
| 7.4 | 31 | 0.037 |
| 7.4 | 33 | 0.039 |
| 7.4 | 28 | 0.034 |

**Frequency Error against Temperature for GPRS 850 band (Mid channel)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 29 | 0.035 |
| 0 | 40 | 0.048 |
| 10 | 35 | 0.042 |
| 20 | 32 | 0.038 |
| 30 | 38 | 0.046 |
| 40 | 37 | 0.045 |
| 50 | 32 | 0.039 |

**Frequency Error against Voltage for GPRS 1900 band (Mid channel)**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 7.4 | 38 | 0.020 |
| 7.4 | 37 | 0.020 |
| 7.4 | 35 | 0.019 |

**Frequency Error against Temperature for GPRS 1900 band (Mid channel)**

| Temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -10 | 34 | 0.018 |
| 0 | 38 | 0.020 |
| 10 | 35 | 0.019 |
| 20 | 32 | 0.017 |
| 30 | 31 | 0.016 |
| 40 | 29 | 0.015 |
| 50 | 38 | 0.20 |

# 9. OCCUPIED BANDWIDTH& Emission Bandwidth

Test limit:

The occupied bandwidth (OBW), that 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, shall be measured when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

The relative OBW must be measured and reported when it is specified in the applicable rule part; otherwise, the 99% OBW shall be measured and reported. The test report shall specify which OBW is reported.

A spectrum/signal analyzer or other instrument providing a spectral display is recommended for these measurements and the video bandwidth shall be set to a value at least three times greater than the IF/resolution bandwidth to avoid any amplitude smoothing. Video filtering shall not be used during occupied bandwidth tests.

The OBW shall be measured for all operating conditions that will affect the bandwidth results (e.g. variable modulations, coding, or channel bandwidth settings). See section 4.

Test procedure:

Occupied bandwidth – relative measurement procedure

The reference value is the highest level of the spectral envelope of the modulated signal.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.

b) The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to prevent the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

e) The dynamic range of the spectrum analyzer at the selected RBW shall be at least 10 dB below the target "-X dB down" requirement (i.e., if the requirement calls for measuring the –26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference value).

f) Set the detection mode to peak, and the trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "-X dB down amplitude" as equal to (Reference Value – X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "–X dB down amplitude" determined in step g). If a marker is below this "-X dB down amplitude" value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and

scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Occupied bandwidth – power bandwidth (99%) measurement procedure

The following procedure shall be used for measuring (99 %) power bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

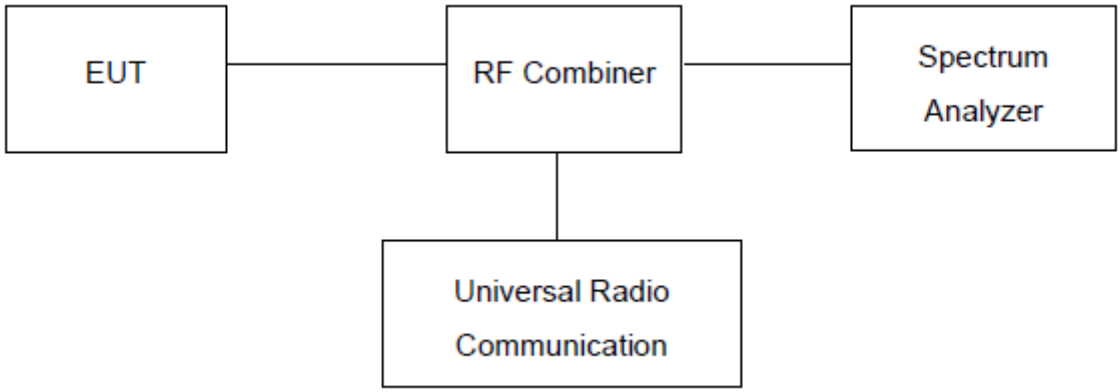
e) Set the detection mode to peak, and the trace mode to max hold..

f) Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

g) If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Test setup:



**GPRS 850:**

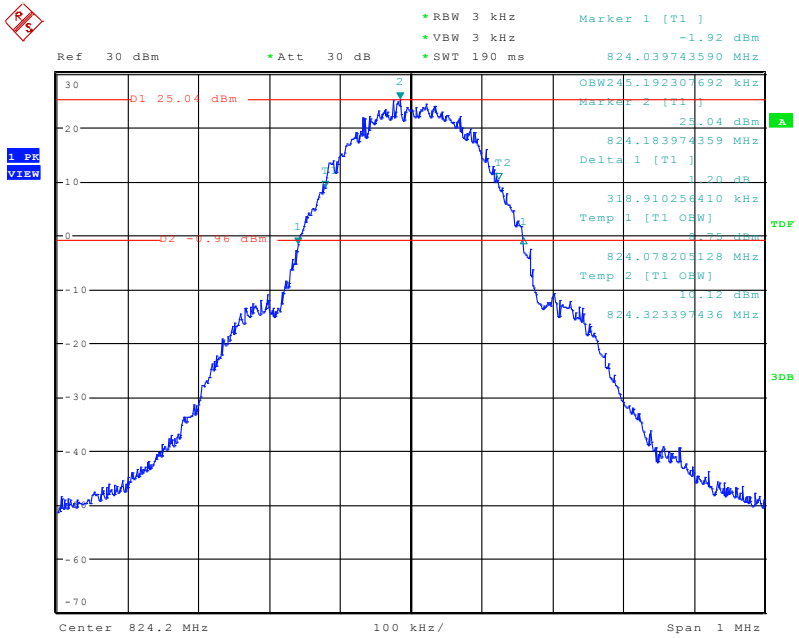
| Frequency (MHz) | OBW(99%) |
|---|---|
| 824.2 | 245.192KHz |
| 836.6 | 246.795KHz |
| 848.8 | 243.590KHz |

**GPRS 1900:**

| Frequency (MHz) | OBW(99%) |
|---|---|
| 1850.2 | 245.192KHz |
| 1880 | 246.795KHz |
| 1909.8 | 246.795KHz |

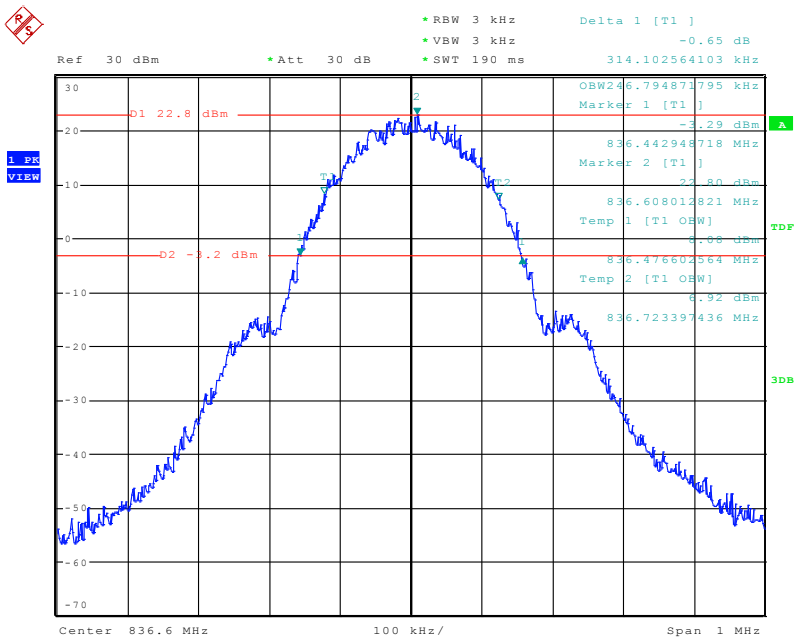
Please refers to Appendix B for compliance test plots

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 128



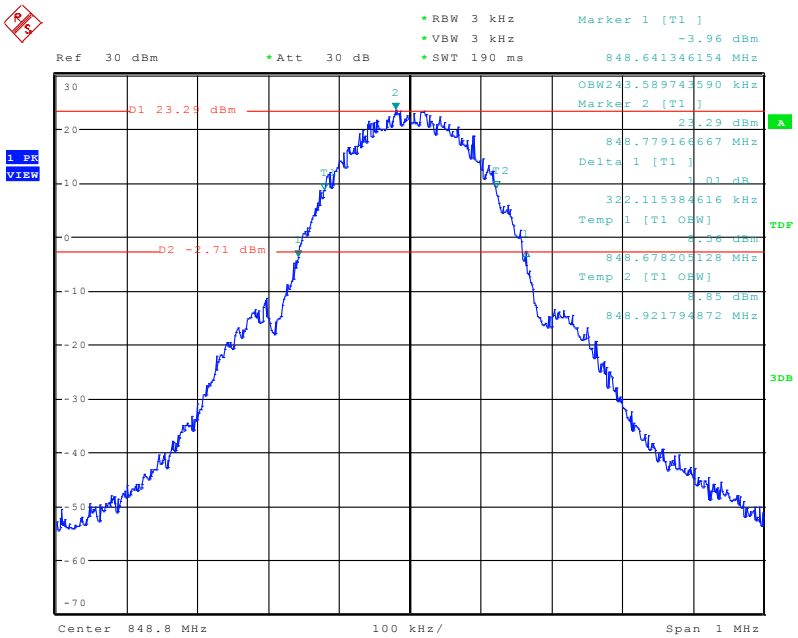

Date: 14.APR.2017 09:38:38

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 190



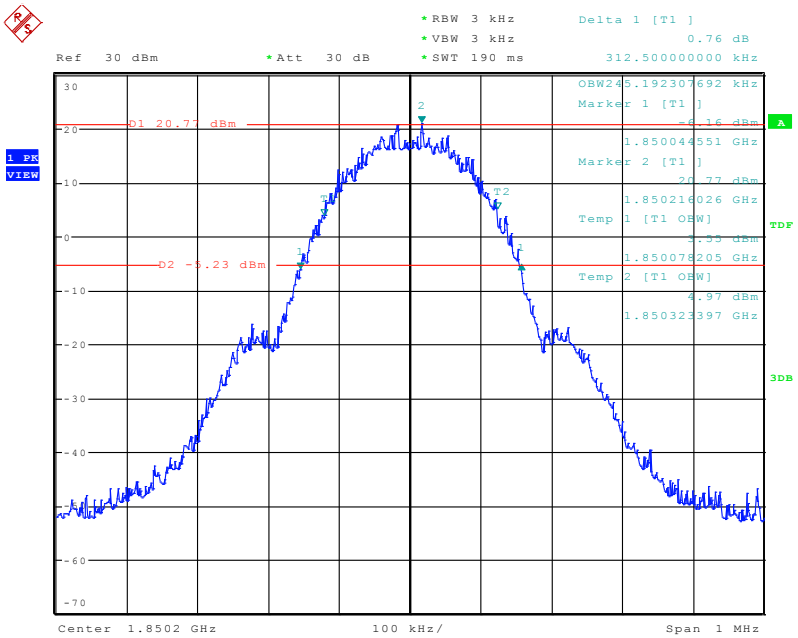

Date: 14.APR.2017 09:42:20

## Occupied Bandwidth (99% and -26dBc) GPRS 850 BAND CH 251



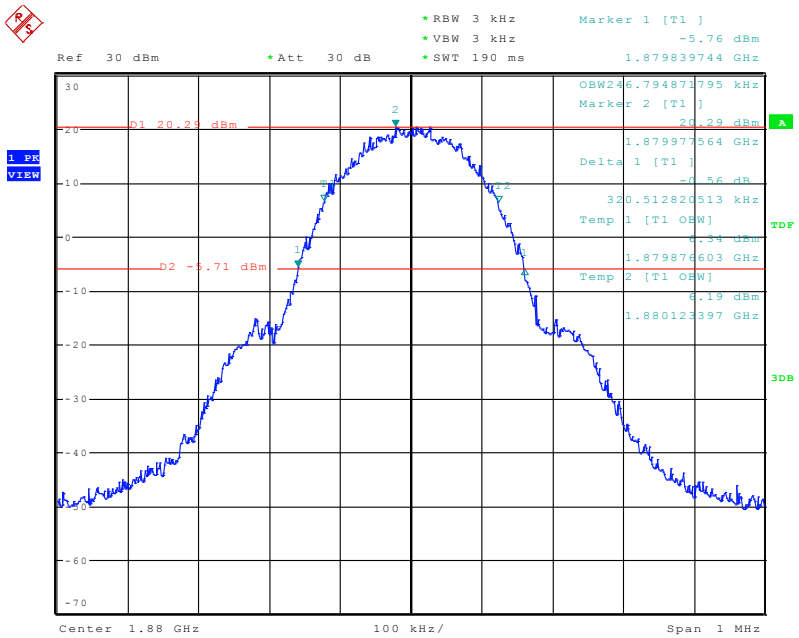

Date: 14.APR.2017 09:45:01

## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 512



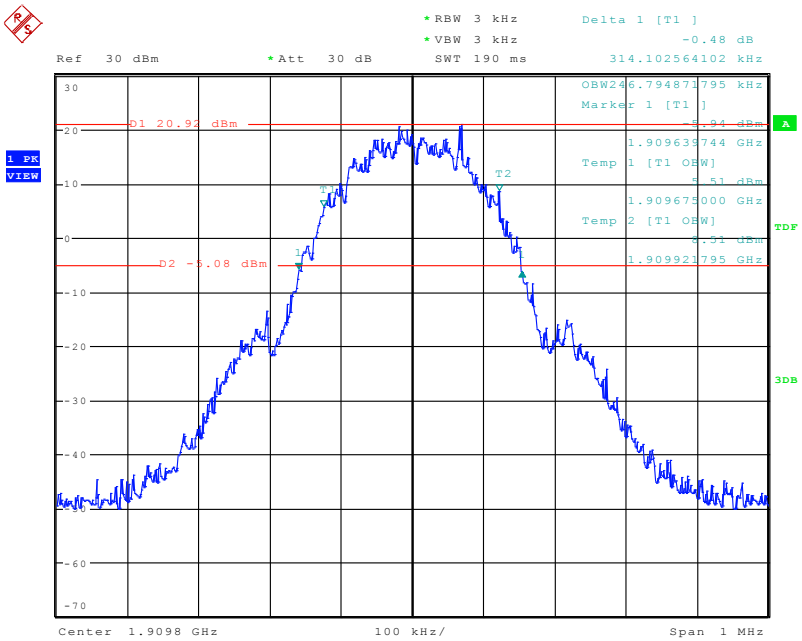

Date: 14.APR.2017 09:50:19

## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 661




Date: 14.APR.2017 09:52:38

## Occupied Bandwidth (99% and -26dBc) GPRS 1900 BAND CH 810



# 10.BAND EDGE

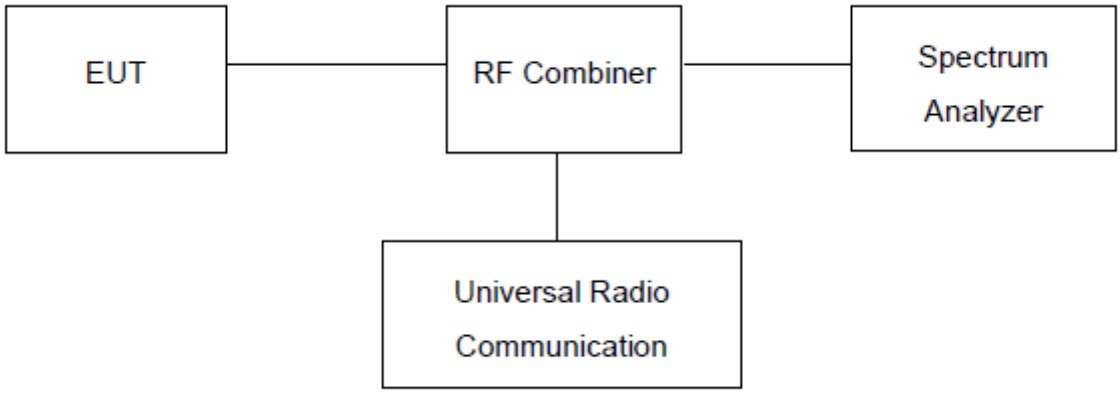
Test Limit:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified. See section 4.

Test procedure:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Test setup:




## Measurement Result

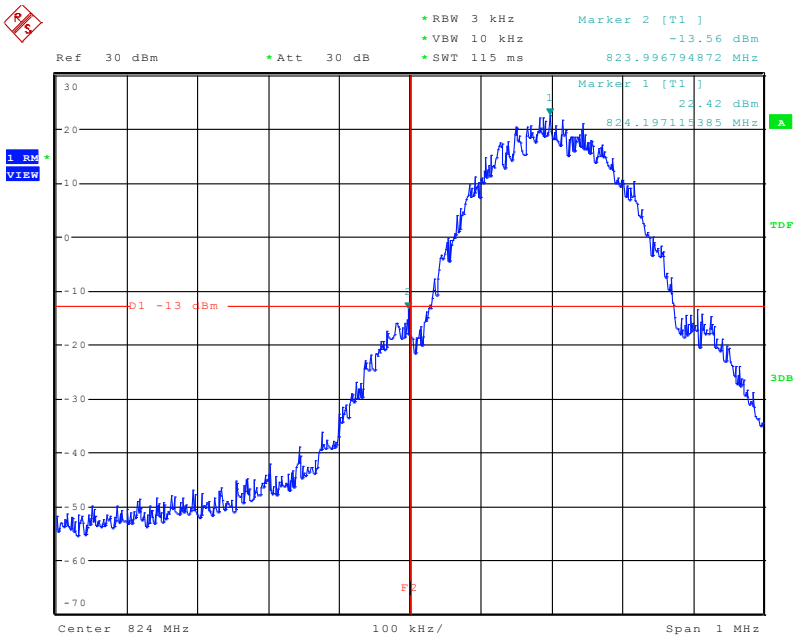
**GPRS 850:**

| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 128 | 824.2 | Pass |
| High Range | 0.2 | 251 | 848.8 | Pass |

**PCS 1900：**

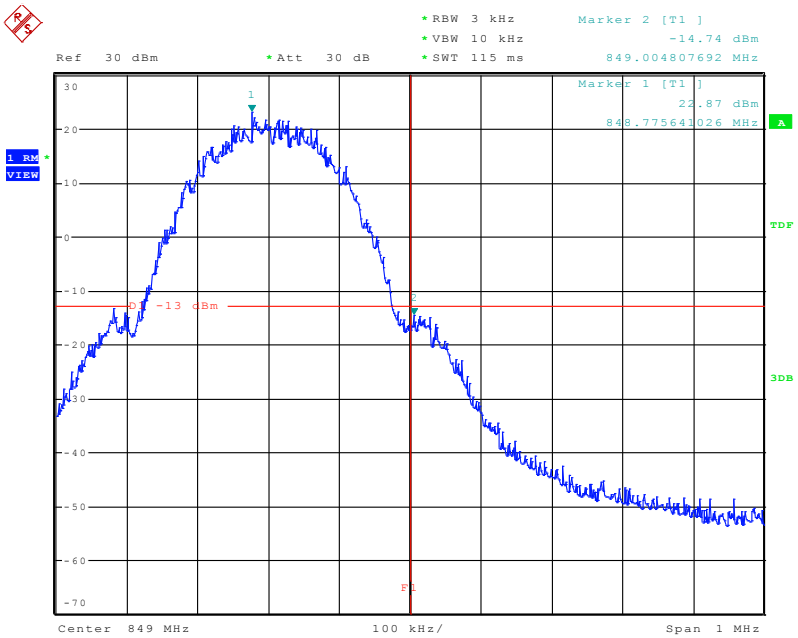
| Test Channel | BW(MHz) | UL Channel | Frequency(MHz) | Judgment |
|---|---|---|---|---|
| Low Range | 0.2 | 512 | 1850.2 | Pass |
| High Range | 0.2 | 810 | 1909.8 | Pass |

## Low Band Edge GPRS 850 BAND CH 128



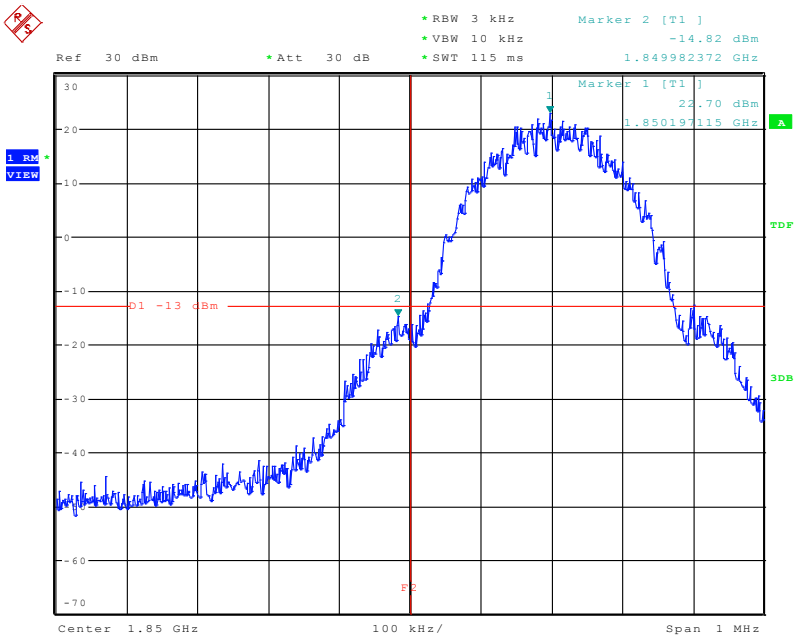

Date: 3.JUN.2017 10:06:41

## High Band Edge GPRS 850 BAND CH 251



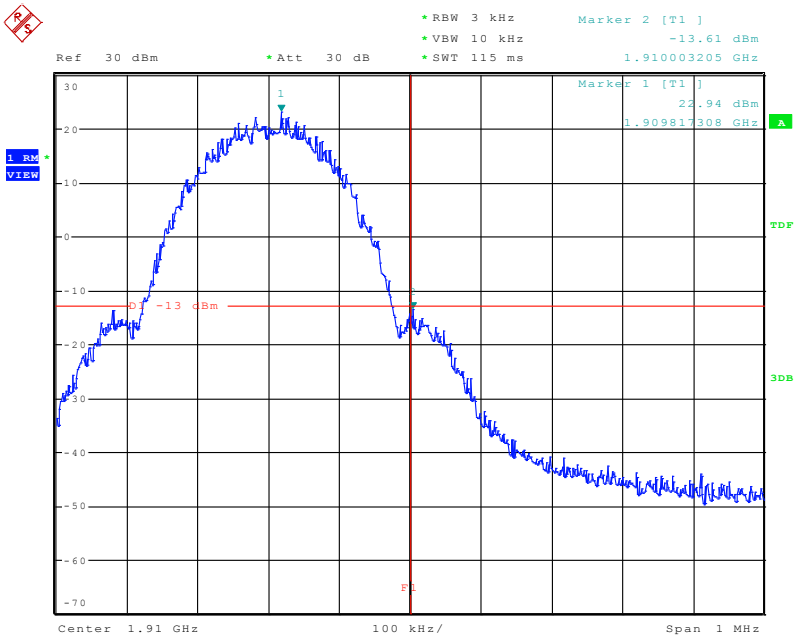

Date: 3.JUN.2017 10:04:38

## Low Band Edge PCS 1900 BAND CH 512




Date: 3.Jl

## High Band Edge PCS 1900 BAND CH 810

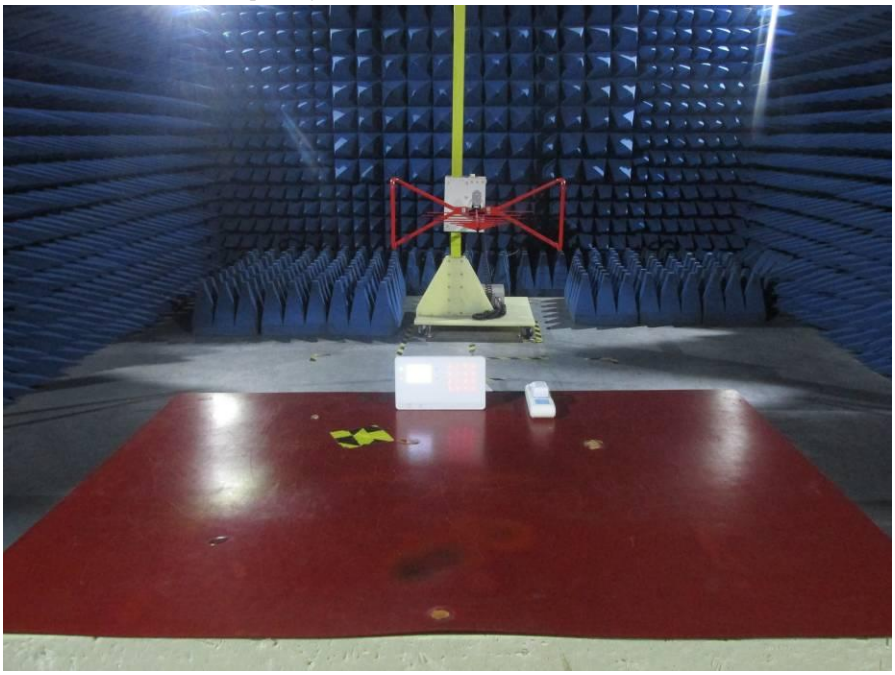



Date: 3.Jl

# 12.EUT TEST PHOTO

RADIATED EMISSION TEST

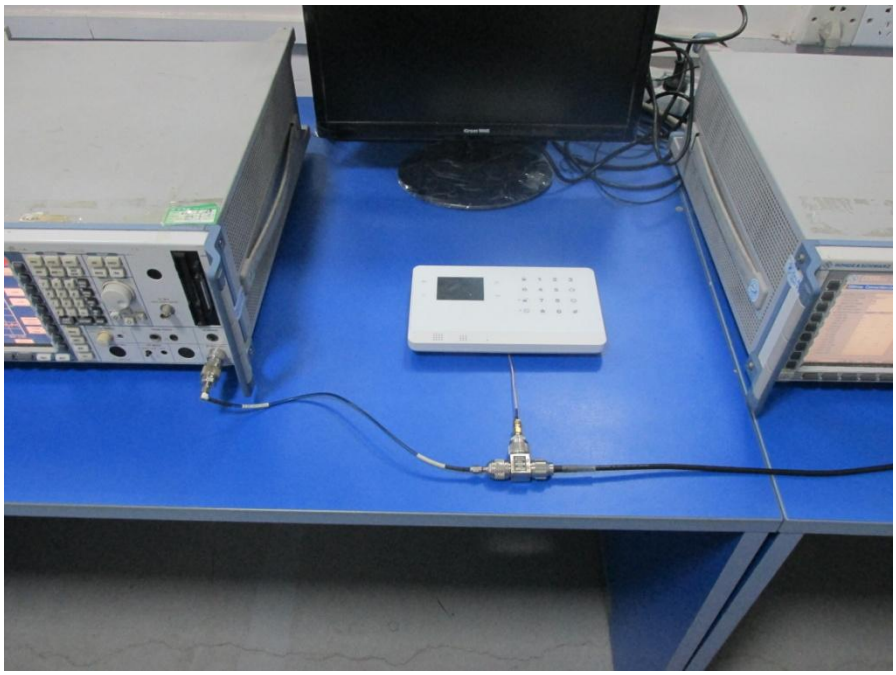
(Frequency from 30MHz to 1GHz)



RADIATED EMISSION TEST

(Frequency above 1GHz)

RF TEST



# 13.EUT PHOTO

Appearance photograph of EUT

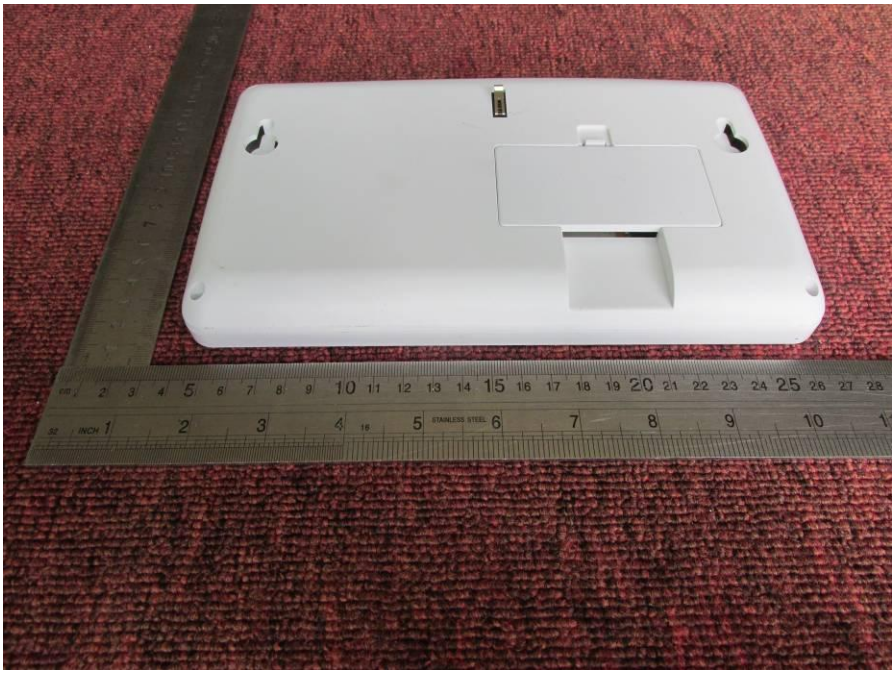

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

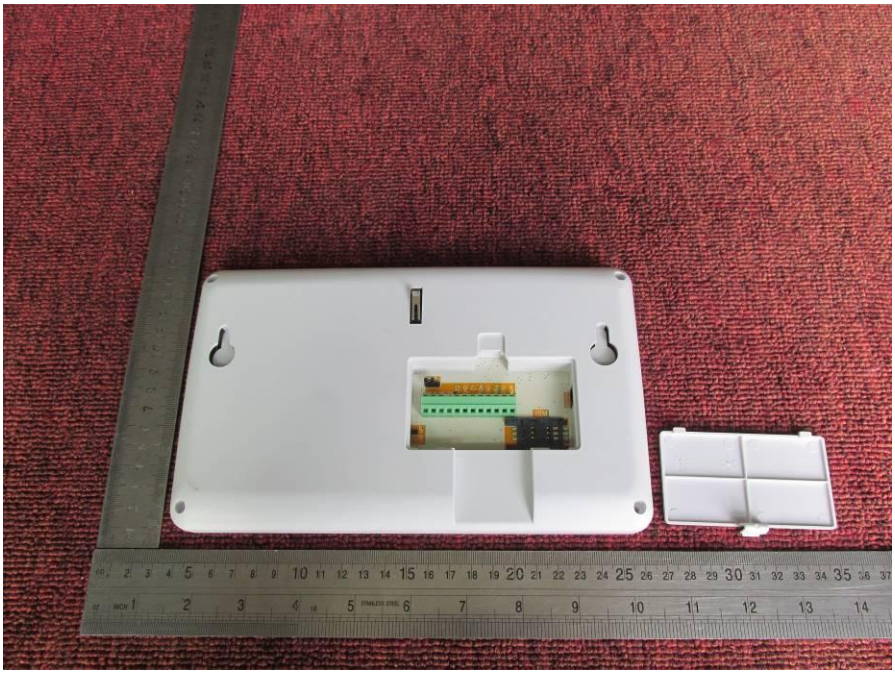
Appearance photograph of EUT

Appearance photograph of EUT



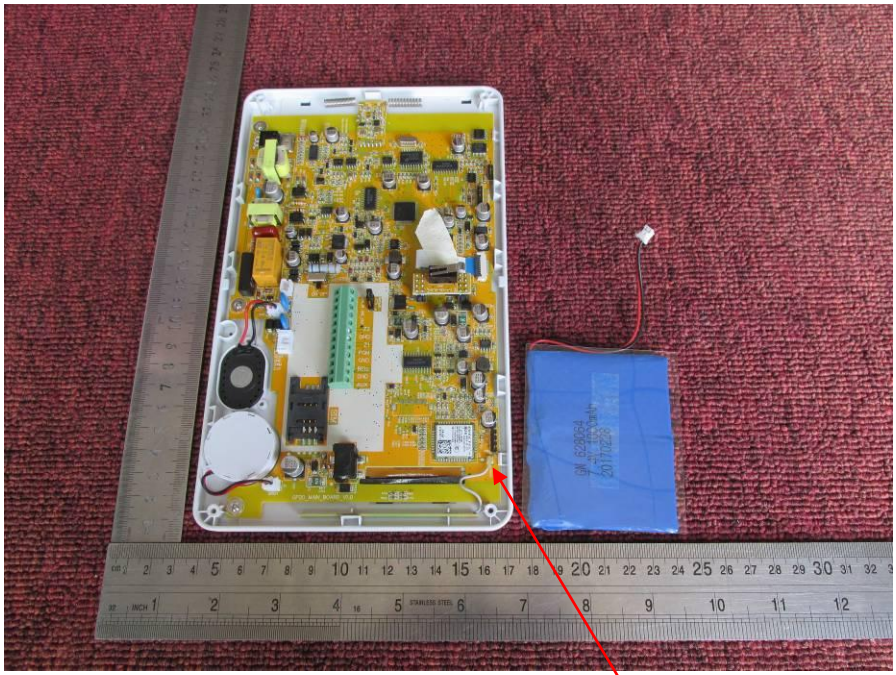
Appearance photograph of EUT


Appearance photograph of EUT



Internal photograph of EUT

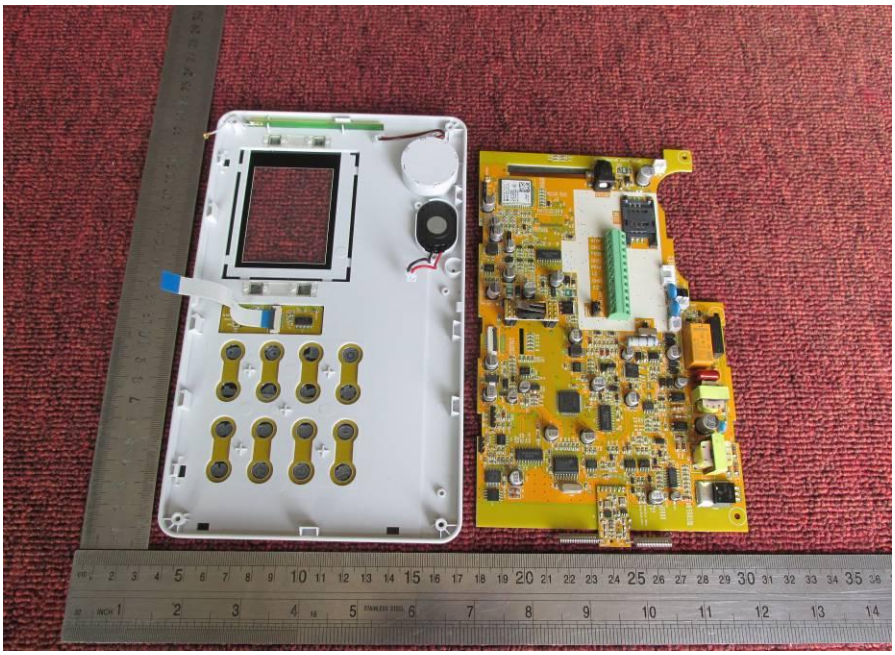
Internal photograph of EUT



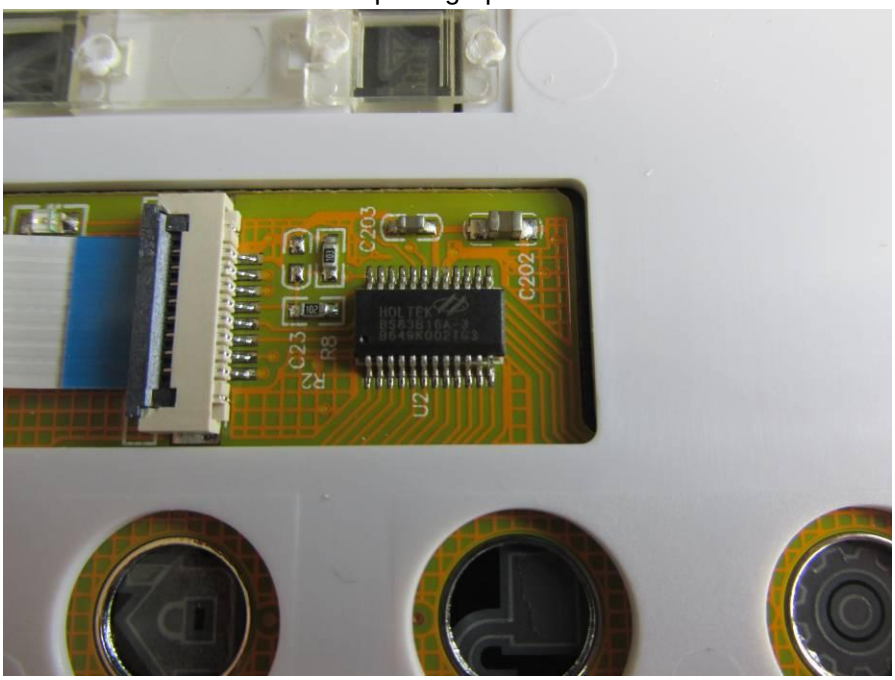
Internal photograph of EUT

Internal photograph of EUT

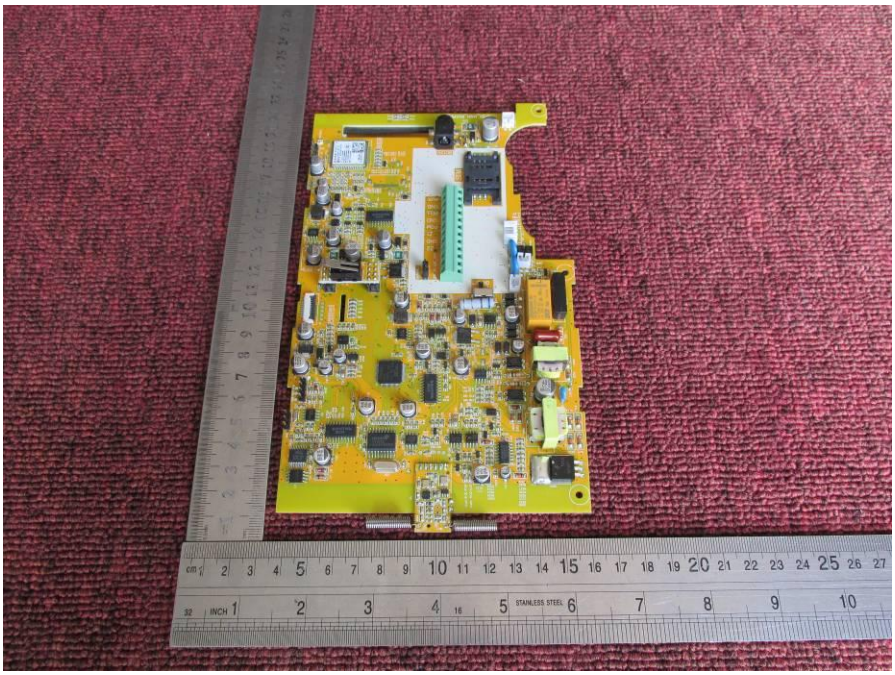
Internal photograph of EUT



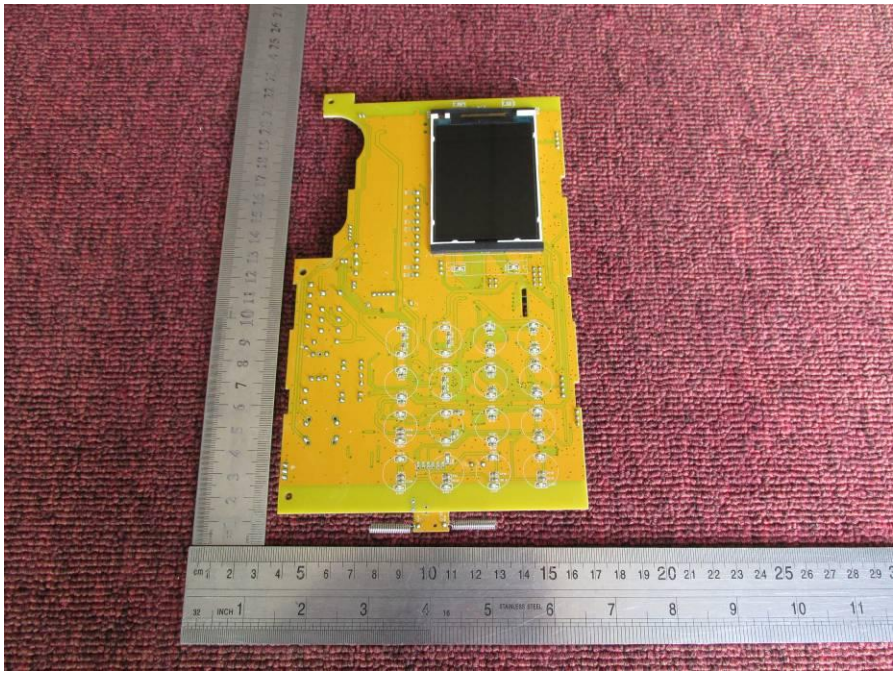
Internal photograph of EUT



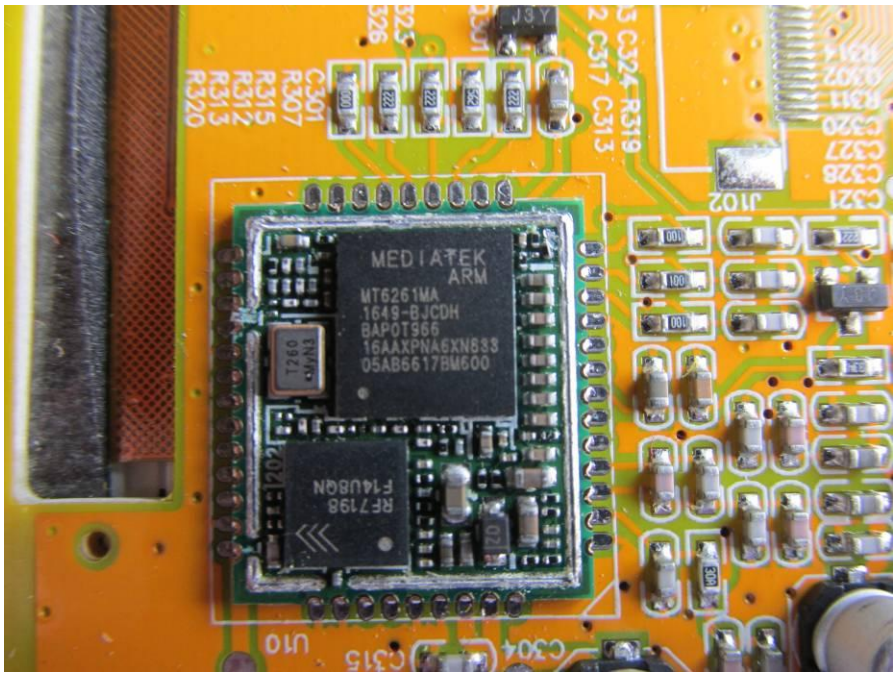
Internal photograph of EUT



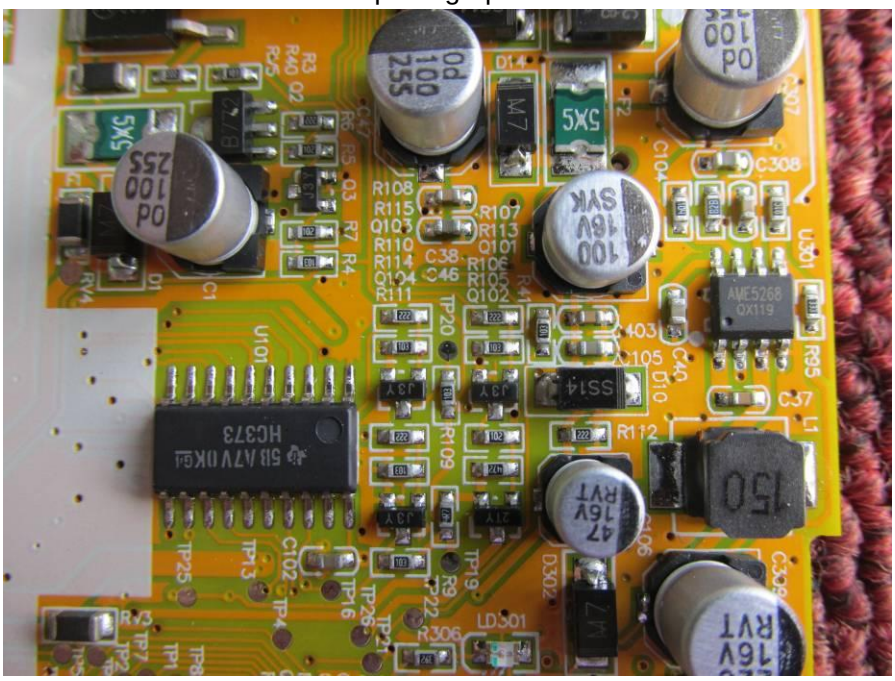
Internal photograph of EUT



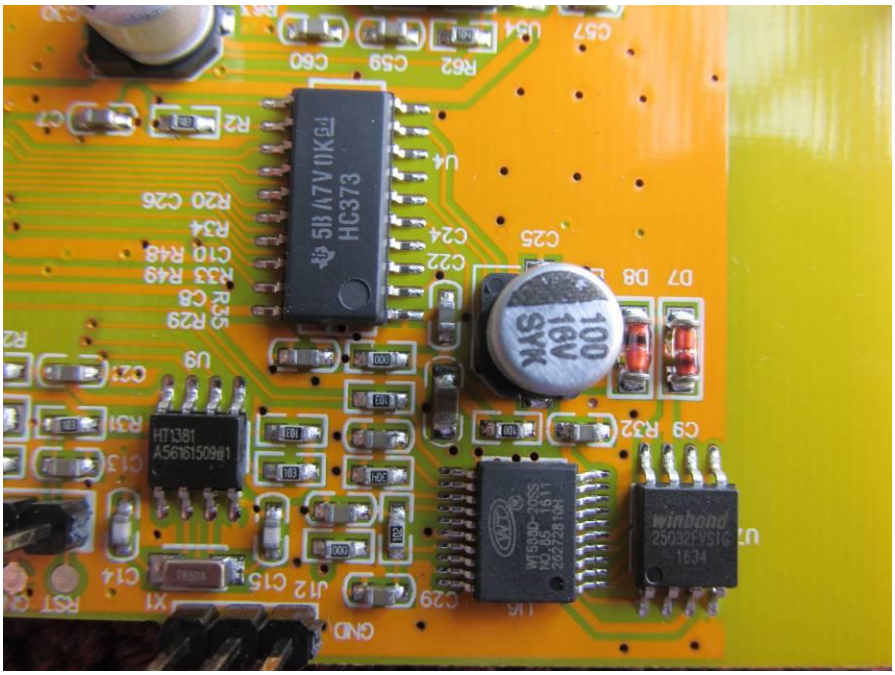
Internal photograph of EUT



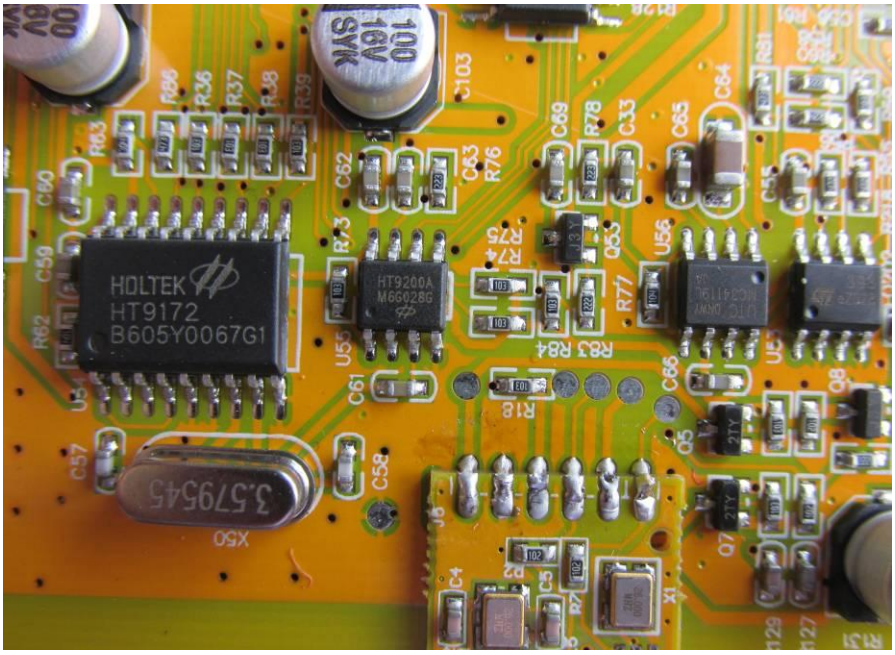

Internal photograph of EUT



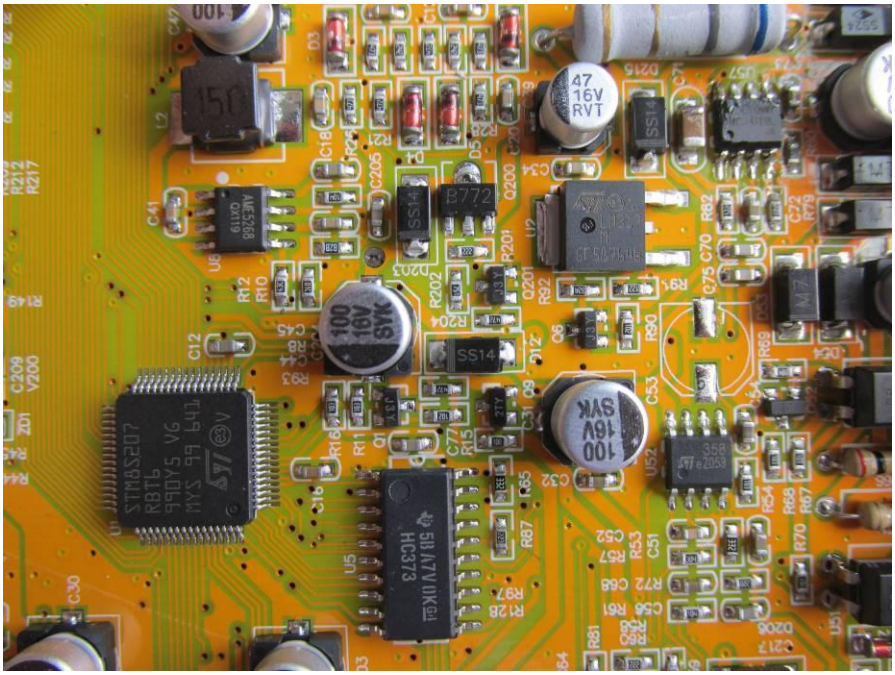
Internal photograph of EUT



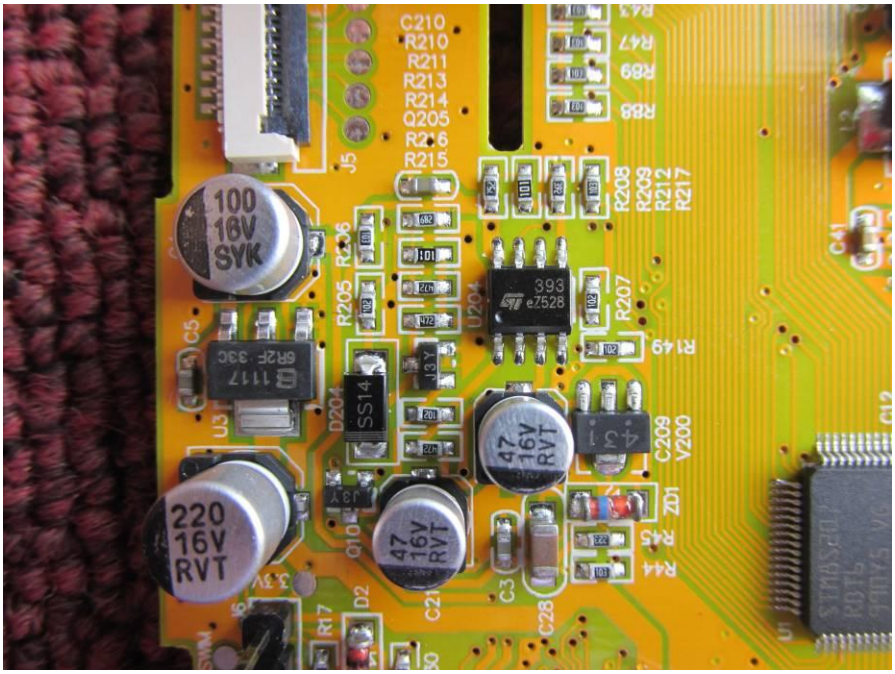

Internal photograph of EUT



Internal photograph of EUT




Internal photograph of EUT




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