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TEST REPORT

FCC Part 22 Subpart H / Part 24 Subpart E

Report Reference No. : **CTL1606012027-WF-01**

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Product Name : Smartwatch

Model/Type reference : HB03

List Model(s)..... : HB04, HB05, HB06, HB07, HB08, G4, G5, G6, G7

Trade Mark..... : HOPU

FCC ID..... : **2A1Z6-HB03**

Applicant's name : **Shenzhen HOPU Smart-Tech Co., Limited**

Address of applicant..... : F5, Bldg4, Hua Feng No.1 Science & Technology Zone, Xixiang street, Bao'an District, Shenzhen, China

Test Firm..... : **Shenzhen CTL Testing Technology Co., Ltd.**

Address of Test Firm : Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard : **FCC CFR Title 47 Part 2, Part 22H and Part 24E**

EIA/TIA 603-D: 2010

KDB 971168 D01

TRF Originator : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF : Dated 2011-01

Date of Receipt..... : Jun. 02, 2016

Date of Test Date..... : Jun. 26, 2016 –Jul. 05, 2016

Data of Issue..... : Jul. 06, 2016

Result..... : Pass

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TEST REPORT

| | | |
|--------------------------|----------------------------|---------------|
| Test Report No. : | CTL1606012027-WF-01 | Jul. 06, 2016 |
| | | Date of issue |

Equipment under Test : Smartwatch

Model /Type : HB03

Listed Models : HB04, HB05, HB06, HB07, HB08, G4, G5, G6, G7

Applicant : **Shenzhen HOPU Smart-Tech Co.,Limited**

Address : F5, Bldg4, Hua Feng No.1 Science &Technology Zone, Xixiang street, Bao'an District, Shenzhen, China

Manufacturer : **Shenzhen YQT Electronic Technology Co.,Ltd**

Address : F5, Bldg4, Hua Feng No.1 Science &Technology Zone, Xixiang street, Bao'an District, Shenzhen, China

| | |
|--------------------|---------------|
| Test result | Pass * |
|--------------------|---------------|

* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.

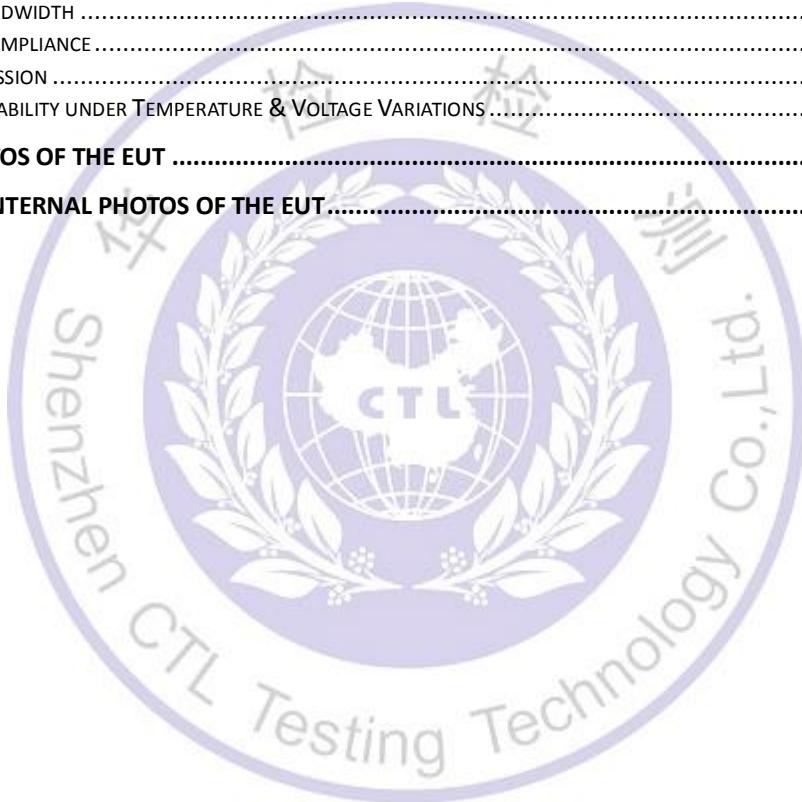
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**** Modified History ****



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1 SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 22: PRIVATE LAND MOBILE RADIO SERVICES.](#)

[FCC Part 24: PUBLIC MOBILE SERVICES](#)

[TIA/EIA 603 D June 2010: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.](#)

[FCC Part 2: FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS](#)

[KDB 971168 D01:v02r02 MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS](#)

[ANSI C63.10-2013 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz](#)

1.2 Test Description

| Test Item | Section in CFR 47 | Result |
|--|--|--------|
| RF Output Power | Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c) | Pass |
| Peak-to-Average Ratio | Part 24.232 (d) | Pass |
| 99% & -26 dB Occupied Bandwidth | Part 2.1049 Part 22.917 Part 24.238 | Pass |
| Spurious Emissions at Antenna Terminal | Part 2.1051 Part 22.917 (a) Part 24.238 (a) | Pass |
| Field Strength of Spurious Radiation | Part 2.1053 Part 22.917 (a) Part 24.238 (a) | Pass |
| Out of band emission, Band Edge | Part 22.917 (a) Part 24.238 (a) | Pass |
| Frequency stability | Part 2.1055 Part 22.355 Part 24.235 | Pass |

1.3 Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

1.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

| Test | Range | Measurement Uncertainty | Notes |
|-----------------------|------------|-------------------------|-------|
| Radiated Emission | 30~1000MHz | 4.10dB | (1) |
| Radiated Emission | Above 1GHz | 4.32dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 3.20dB | (1) |

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2 GENERAL INFORMATION

2.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---------------------|---------|
| Normal Temperature: | 25°C |
| Relative Humidity: | 55 % |
| Air Pressure: | 101 kPa |

2.2 General Description of EUT

| | |
|-----------------------|---|
| Product Name: | Smartwatch |
| Model/Type reference: | HB03 |
| Power supply: | DC 3.7V from battery |
| Hardware version: | V1.1 |
| Software version: | V4.0 |
| 2G | |
| Operation Band: | GSM850, GSM900, DCS1800, PCS1900 |
| Supported Type: | GSM |
| Power Class: | GSM850:Power Class 4 PCS1900:Power Class 1 |
| Modulation Type: | GMSK for GSM |
| GSM Release Version | R99 |

Note: For more details, refer to the user's manual of the EUT.

Remark: The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850 and PCS1900 bands test data included in this report.

2.3 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CUM200 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

Test Frequency:

| GSM 850 | | PCS1900 | |
|---------|-----------------|---------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 128 | 824.20 | 512 | 1850.20 |
| 190 | 836.60 | 661 | 1880.00 |
| 251 | 848.80 | 810 | 1909.80 |

Test Modes:

The test mode(s) are selected according to relevant radio technology specifications.

| Test Mode | Test Modes Description |
|-----------|----------------------------------|
| Mode 1 | GSM system, GSM, GMSK modulation |

2.4 Equipments Used during the Test

| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|----------------------------|----------------------|---------------------------|------------|------------------|----------------------|
| Bilog Antenna | Sunol Sciences Corp. | JB1 | A061713 | 2016/06/02 | 2017/06/01 |
| Bilog Antenna | Sunol Sciences Corp. | JB1 | A061714 | 2016/06/02 | 2017/06/01 |
| EMI Test Receiver | R&S | ESCI | 103710 | 2016/06/02 | 2017/06/01 |
| Spectrum Analyzer | Agilent | E4407B | MY41440676 | 2016/05/21 | 2017/05/20 |
| Spectrum Analyzer | Agilent | N9020 | US46220290 | 2016/01/17 | 2017/01/16 |
| Controller | EM Electronics | Controller EM 1000 | N/A | 2016/05/21 | 2017/05/20 |
| Horn Antenna | Sunol Sciences Corp. | DRH-118 | A062013 | 2016/05/19 | 2017/05/18 |
| Horn Antenna | Sunol Sciences Corp. | DRH-118 | A062014 | 2016/05/19 | 2017/05/18 |
| Active Loop Antenna | SCHWARZBEC K | FMZB1519 | 1519-037 | 2016/05/19 | 2017/05/18 |
| Amplifier | Agilent | 8349B | 3008A02306 | 2016/05/19 | 2017/05/18 |
| Amplifier | Agilent | 8447D | 2944A10176 | 2016/05/19 | 2017/05/18 |
| Temperature/Humidity Meter | Gangxing | CTH-608 | 02 | 2016/05/20 | 2017/05/19 |
| Radio Communication Tester | R&S | CMU200 | 115419 | 2016/05/22 | 2017/05/21 |
| High-Pass Filter | K&L | 9SH10-2700/X1 2750-O/O | N/A | 2016/05/20 | 2017/05/19 |
| High-Pass Filter | K&L | 41H10-1375/U1 2750-O/O | N/A | 2016/05/20 | 2017/05/19 |
| RF Cable | HUBER+SUHN ER | RG214 | N/A | 2016/05/20 | 2017/05/19 |
| Climate Chamber | ESPEC | EL-10KA | A20120523 | 2016/05/20 | 2017/05/19 |
| SIGNAL GENERATOR | Agilent | E4421B | US40051744 | 2016/05/20 | 2017/05/19 |
| Directional Coupler | Agilent | 87300B | 3116A03638 | 2016/05/20 | 2017/05/19 |

2.5 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AIZ6-HB03 filing to comply with of the FCC Part 22 and Part 24 Rules.

2.6 Modifications

No modifications were implemented to meet testing criteria.



3 TEST CONDITIONS AND RESULTS

3.1 Output Power

LIMIT

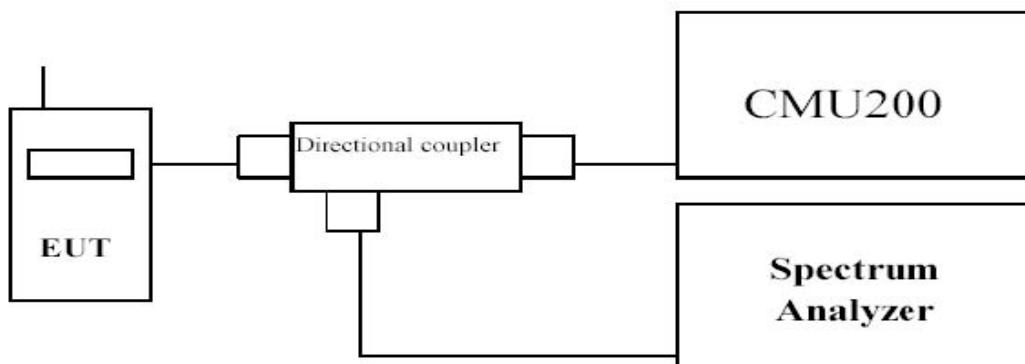
GSM850/WCDMA Band V: 7W

PCS1900/WCDMA Band II: 2W

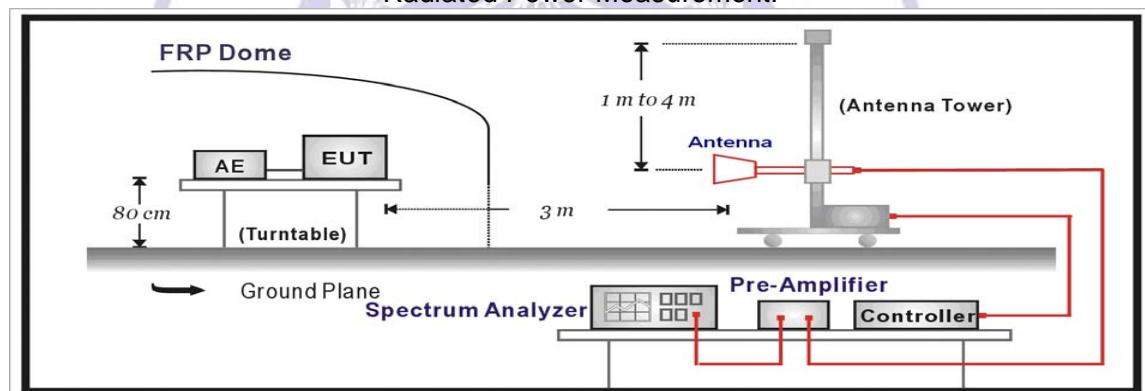
The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION

Conducted Power Measurement



Radiated Power Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Conducted Power Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.
- EUT Communicate with CMU200 then selects a channel for testing.
- Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter

- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

TEST RESULTS

Conducted Measurement:

| EUT Mode | Channel | Frequency (MHz) | Avg.Burst Power (dBm) | Peak-to-Average Ratio (dB) | Limit (dBm) | Result |
|-----------------------|---------|-----------------|-----------------------|----------------------------|-------------|--------|
| GSM 850 (GMSK) | 128 | 824.20 | 32.58 | / | 38.45 | Pass |
| | 190 | 836.60 | 32.65 | / | | |
| | 251 | 848.80 | 32.41 | / | | |
| GPRS1900 (GMSK,1Slot) | 512 | 1850.20 | 29.89 | 0.33 | 33.01 | Pass |
| | 661 | 1880.00 | 29.95 | 0.58 | | |
| | 810 | 1909.80 | 29.41 | 0.41 | | |

Note: 1. Peak-to-Average Ratio= maximum PK burst power-maximum Avg. burst power.

Radiated Measurement:

Note: 1. The field strength of radiation emission was measured in the following position: EUT stand-up position (Zaxis), lie-down position (X, Y axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of Z axis was reported.

Note: 2 We test the H direction and V direction and V direction is worse.

GSM850

| Channel | P _{Mea} (dBm) | P _{cl} (dB) | G _a Antenna Gain(dB) | Correction (dB) | P _{Ag} (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---------|------------------------|----------------------|---------------------------------|-----------------|----------------------|-----------|-------------|-------------|--------------|
| 128 | -10.59 | 2.42 | 8.45 | 2.15 | 36.82 | 30.11 | 38.45 | 8.34 | V |
| 190 | -10.34 | 2.46 | 8.45 | 2.15 | 36.82 | 30.32 | 38.45 | 8.13 | V |
| 251 | -10.09 | 2.53 | 8.36 | 2.15 | 36.82 | 30.41 | 38.45 | 8.04 | V |

PCS1900

| Channel | P _{Mea} (dBm) | P _{cl} (dB) | G _a Antenna Gain(dB) | P _{Ag} (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---------|------------------------|----------------------|---------------------------------|----------------------|------------|-------------|-------------|--------------|
| 512 | -11.32 | 3.41 | 10.24 | 33.6 | 29.11 | 33.01 | 3.90 | V |
| 661 | -11.12 | 3.49 | 10.24 | 33.6 | 29.23 | 33.01 | 3.78 | V |
| 810 | -11.23 | 3.55 | 10.23 | 33.6 | 29.05 | 33.01 | 3.96 | V |

Remark:

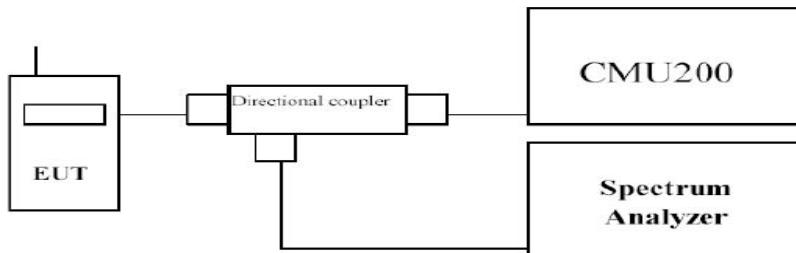
1. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$
2. $ERP = EIRP - 2.15dBi$ as EIRP by subtracting the gain of the dipole.

3.2 Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



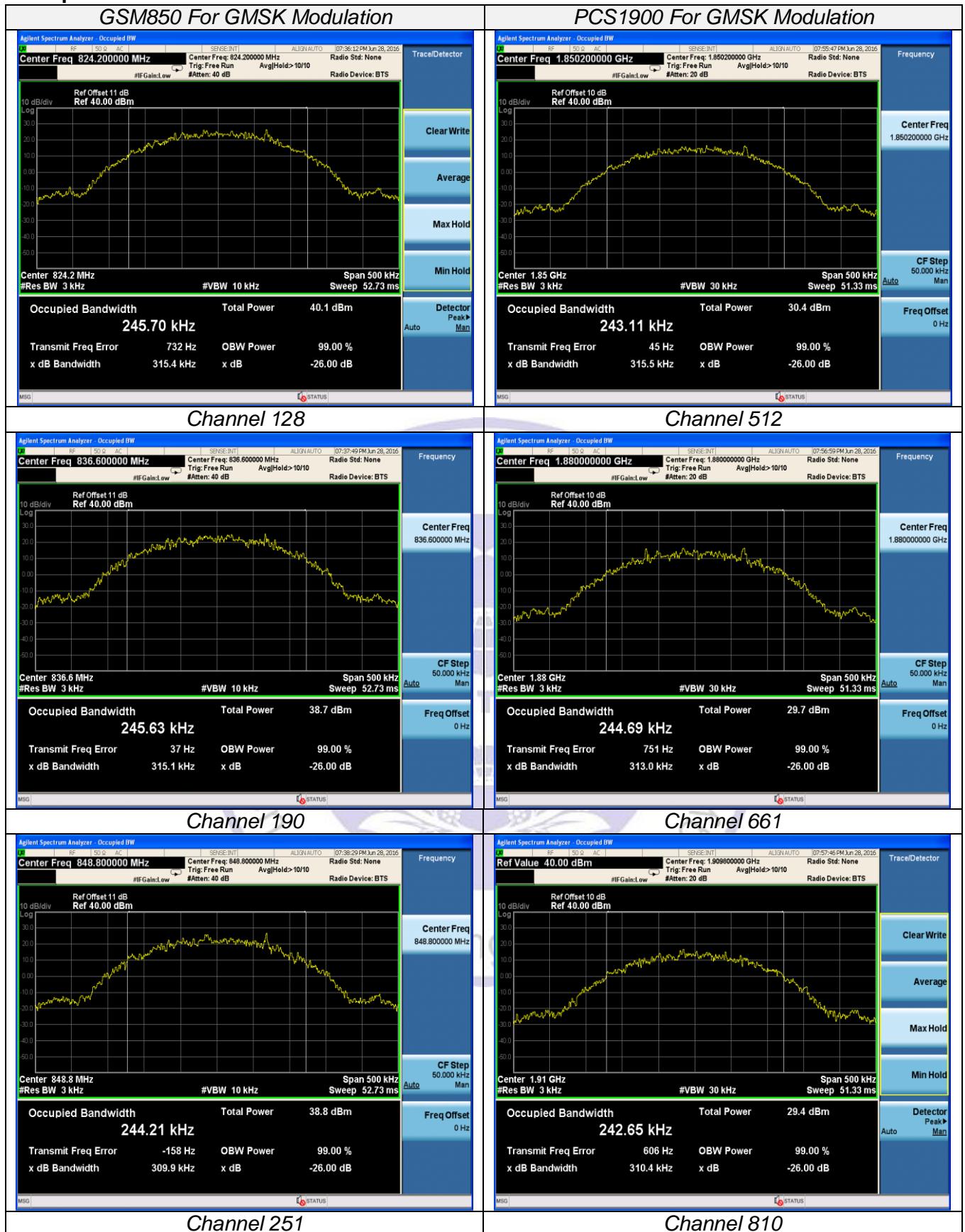
TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, $VBW \geq 3$ times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

| EUT Mode | Channel | Frequency (MHz) | 99% Occupy bandwidth (KHz) | -26dB bandwidth (KHz) |
|----------------|---------|-----------------|----------------------------|-----------------------|
| GSM 850 (GMSK) | 128 | 824.20 | 243.260 | 311.189 |
| | 190 | 836.60 | 245.017 | 311.483 |
| | 251 | 848.80 | 246.412 | 313.108 |
| PCS1900 (GMSK) | 512 | 1850.20 | 244.599 | 311.761 |
| | 661 | 1880.00 | 243.853 | 305.466 |
| | 810 | 1909.80 | 241.001 | 313.017 |

Test plots as follow:

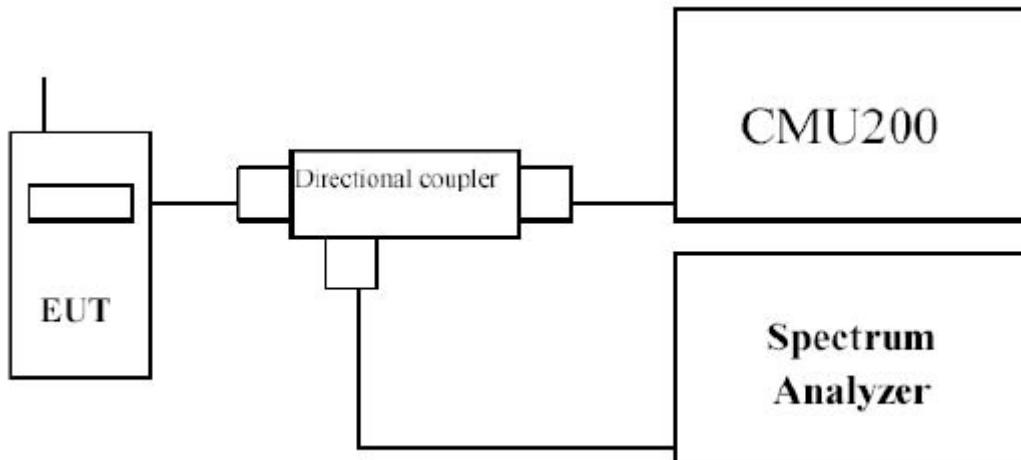


3.3 Band Edge compliance

LIMIT

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.

TEST CONFIGURATION



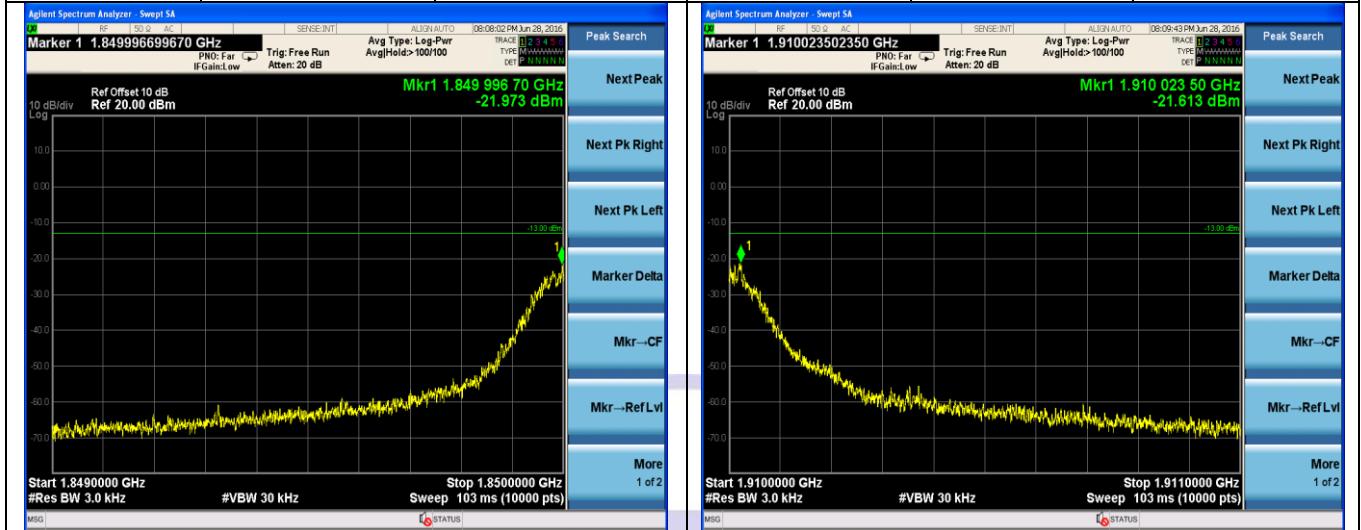
TEST PROCEDURE

In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

TEST RESULTS

| Channel Number | Frequency (MHz) | Max Measurement Results | | Limit (dBm) | Verdict |
|----------------|-----------------|-------------------------|--------------|-------------|---------|
| | | Frequency (MHz) | Values (dBm) | | |
| 128 | 824.20 | 823.9968 | -22.314 | -13.00 | Pass |
| 251 | 848.80 | 849.0192 | -23.367 | -13.00 | Pass |
| | | | | | |
| | | | | | |

| PCS1900 | | | | | |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Verdict |
| | | Frequency (MHz) | Values (dBm) | | |
| 512 | 1850.20 | 1849.9967 | -21.973 | -13.00 | Pass |
| 810 | 1909.80 | 1910.0235 | -27.613 | -13.00 | Pass |



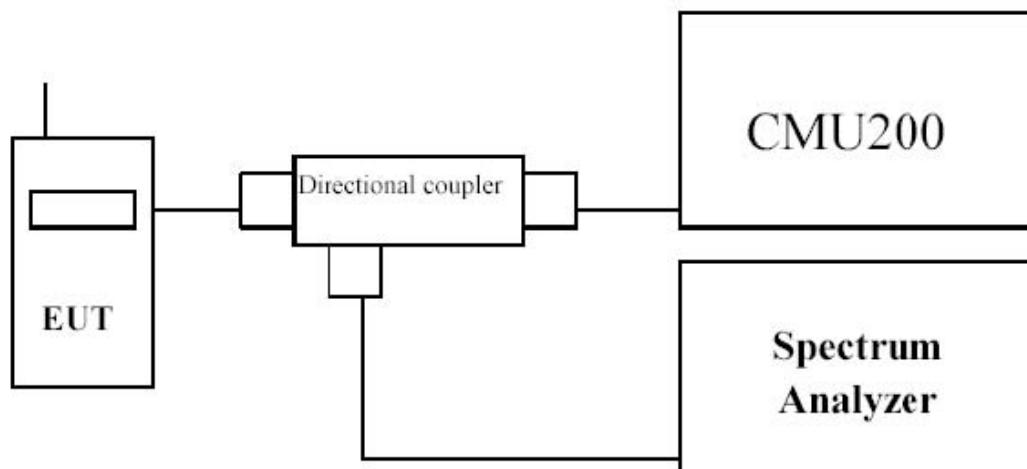

3.4 Spurious Emission

LIMIT

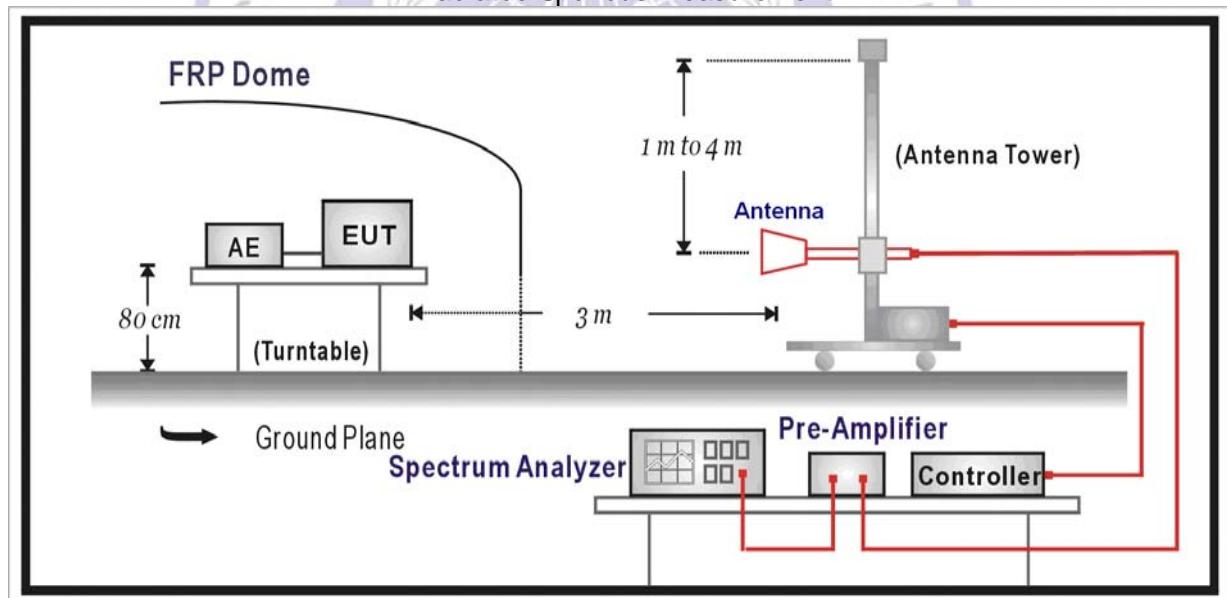
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

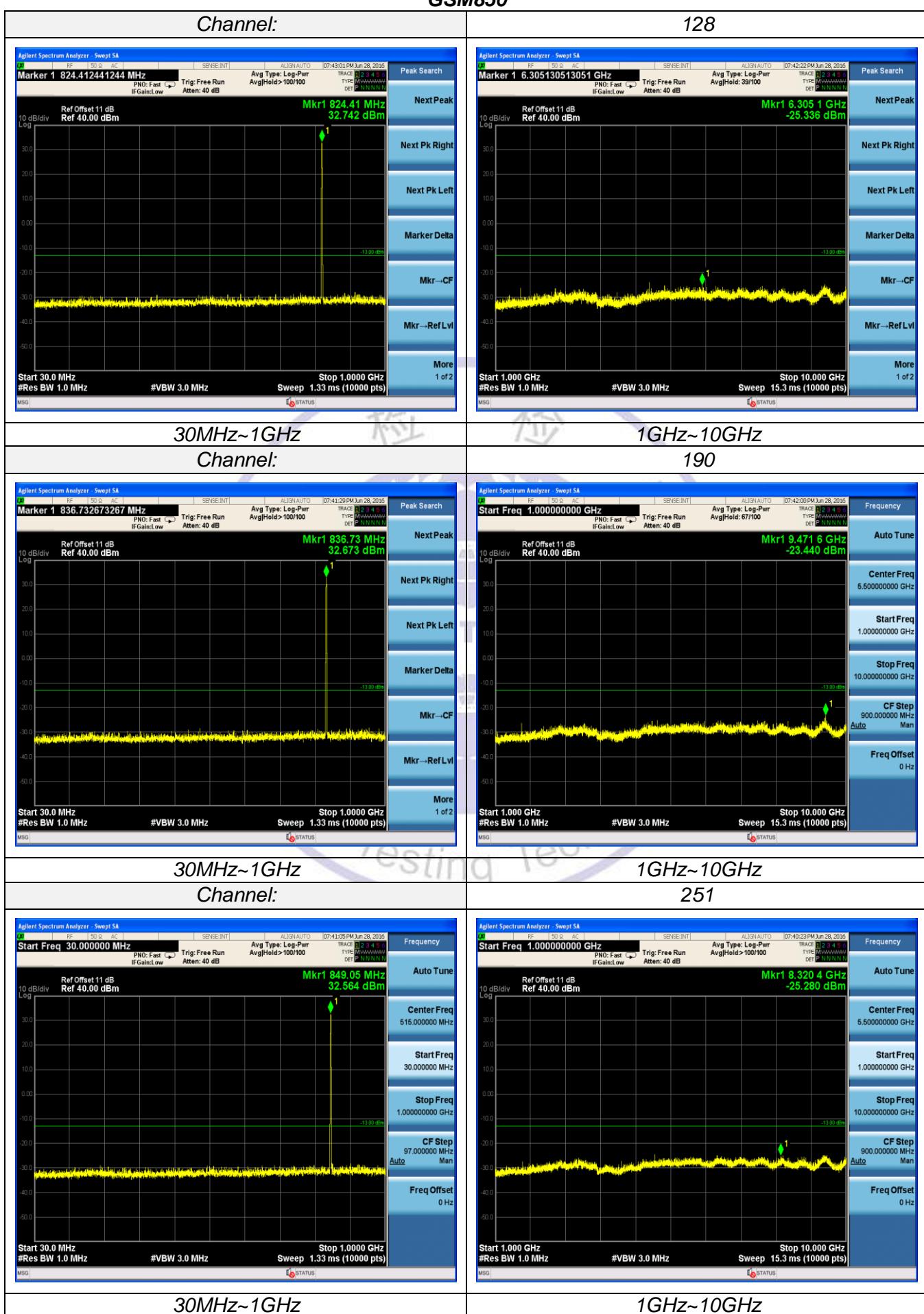
Conducted Spurious Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Coupler.
- EUT Communicate with CMU200 then selects a channel for testing.

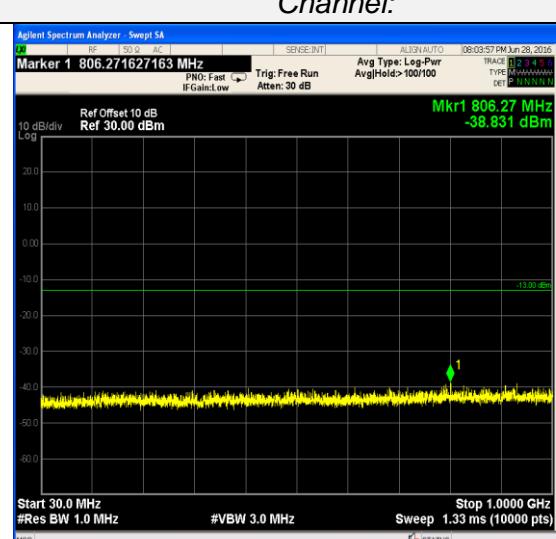
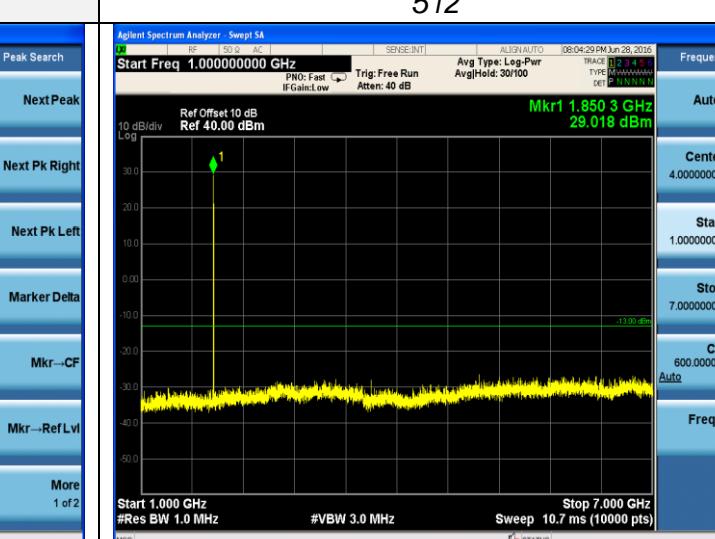
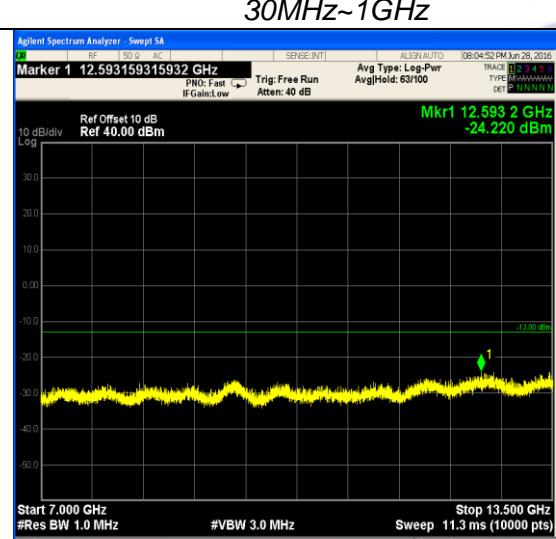
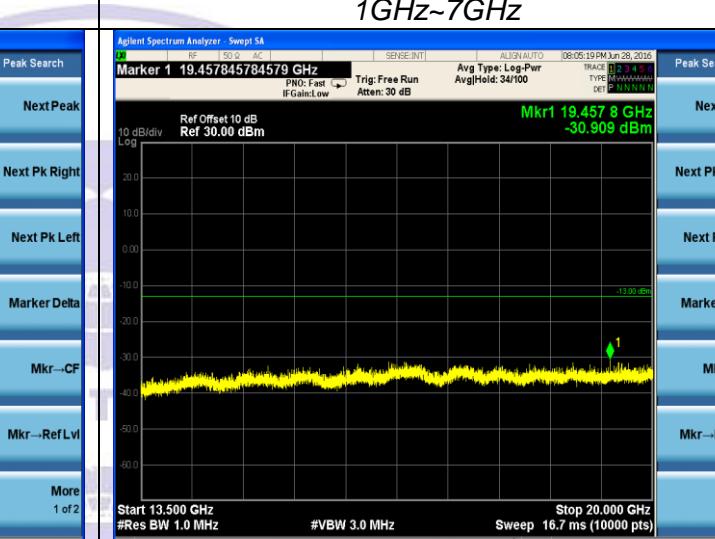
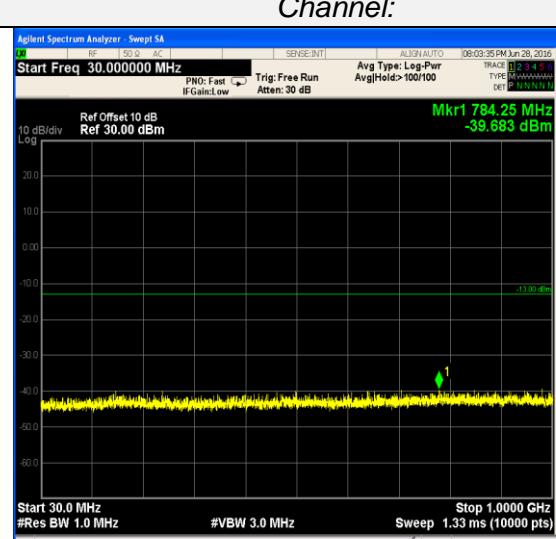
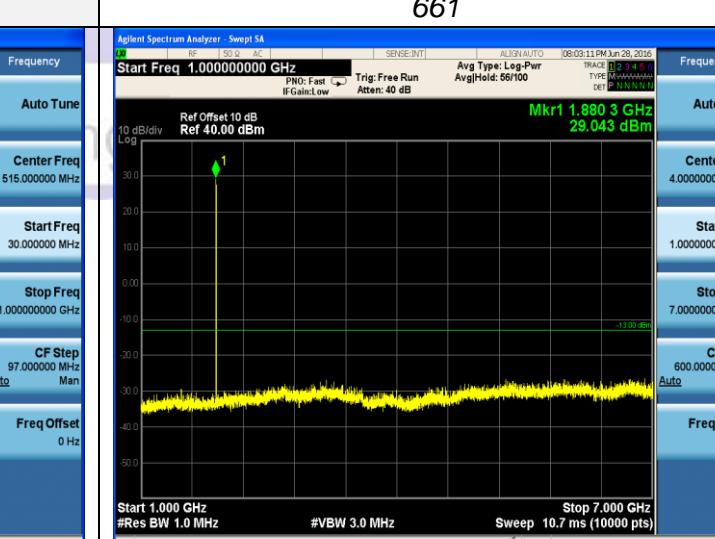
- d) Add a correction factor to the display of spectrum, and then test.
- e) The resolution bandwidth of the spectrum analyzer was set at 1MHz for Part 22 and 1MHz for Part 24, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

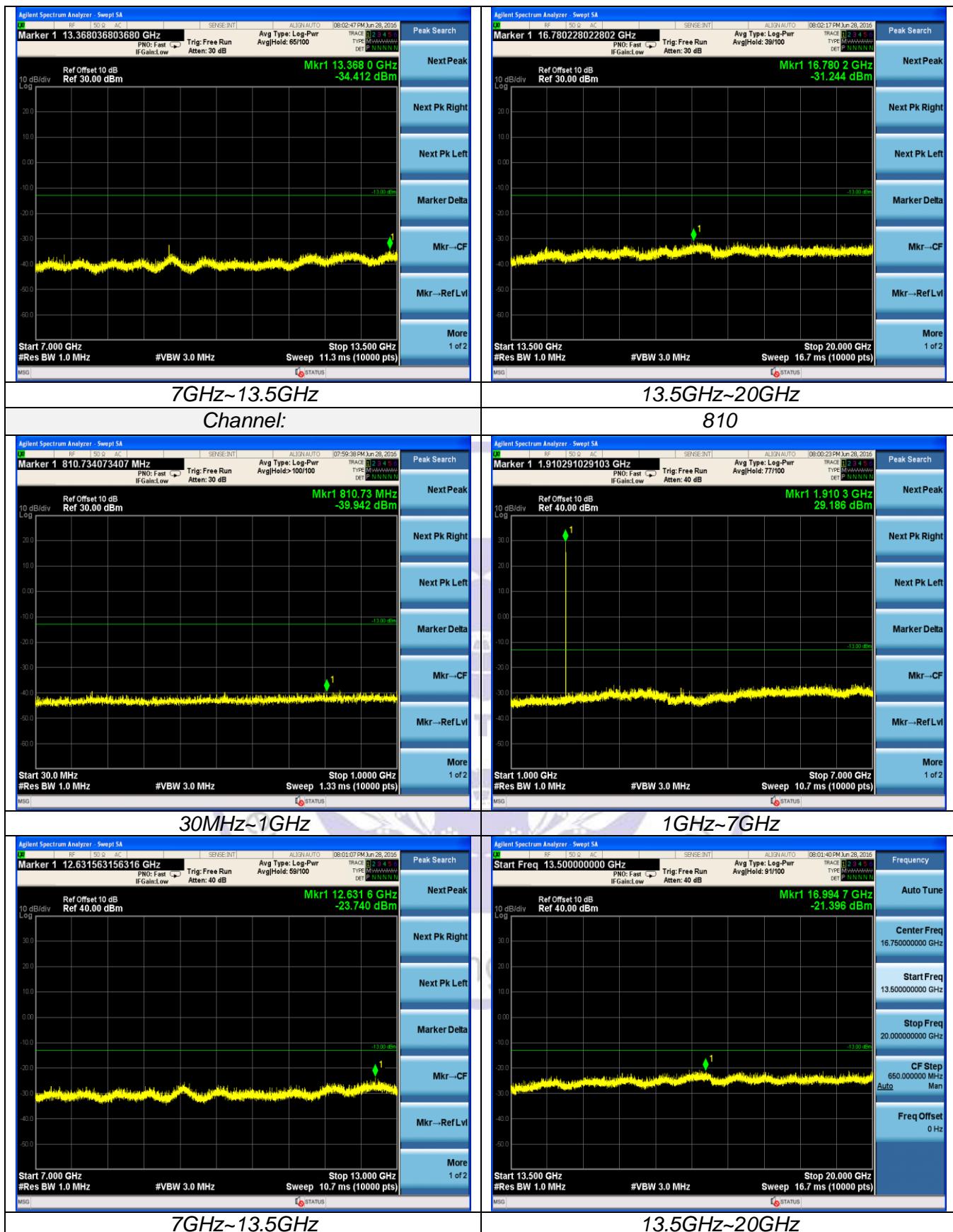
Radiated Spurious Measurement:

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q) The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.

TEST RESULTS**Conducted Measurement:****GSM850**

PCS1900

| Channel: | 512 |
|--|---|
|  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 1.850 3 GHz 29.018 dBm</p> <p>Start Freq 1.000000000 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 30/100</p> <p>Ref Offset 10 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Start 3.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.33 ms (10000 pts)</p> <p>More 1 of 2</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 1.850 3 GHz 29.018 dBm</p> <p>Start Freq 1.000000000 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 30/100</p> <p>Ref Offset 10 dB Ref 40.00 dBm</p> <p>10 dB/div Log</p> <p>Start 1.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.7 ms (10000 pts)</p> <p>More 1 of 2</p> |
| 30MHz~1GHz | 1GHz~7GHz |
|  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 12.593159315932 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 63/100</p> <p>Ref Offset 10 dB Ref 40.00 dBm</p> <p>10 dB/div Log</p> <p>Start 7.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 11.3 ms (10000 pts)</p> <p>More 1 of 2</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 19.457845784579 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 34/100</p> <p>Ref Offset 10 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Start 13.500 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 16.7 ms (10000 pts)</p> <p>More 1 of 2</p> |
| 7GHz~13.5GHz | 13.5GHz~20GHz |
| Channel: | 661 |
|  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 1.880 3 GHz 29.043 dBm</p> <p>Start Freq 1.000000000 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 56/100</p> <p>Ref Offset 10 dB Ref 40.00 dBm</p> <p>10 dB/div Log</p> <p>Start 1.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.7 ms (10000 pts)</p> <p>More 1 of 2</p> |  <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 1.880 3 GHz 29.043 dBm</p> <p>Start Freq 1.000000000 GHz</p> <p>PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 56/100</p> <p>Ref Offset 10 dB Ref 40.00 dBm</p> <p>10 dB/div Log</p> <p>Start 1.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.7 ms (10000 pts)</p> <p>More 1 of 2</p> |
| 30MHz~1GHz | 1GHz~7GHz |



Radiated Measurement:**GSM 850**

| Channel | Frequency (MHz) | P _{Mea} (dBm) | P _{cl} (dB) | Diatance | G _a Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---------|-----------------|------------------------|----------------------|----------|---------------------------------|-----------------|-------------|-------------|--------------|
| 128 | 1648.40 | -33.16 | 3.00 | 3.00 | 9.58 | -26.58 | -13.00 | 13.58 | H |
| | 2472.60 | -37.10 | 3.47 | 3.00 | 10.72 | -29.85 | -13.00 | 16.85 | H |
| | 1648.40 | -31.01 | 3.00 | 3.00 | 9.68 | -24.33 | -13.00 | 11.33 | V |
| | 2472.60 | -36.72 | 3.47 | 3.00 | 10.72 | -29.47 | -13.00 | 16.47 | V |
| 190 | 1673.20 | -30.69 | 3.14 | 3.00 | 9.61 | -24.22 | -13.00 | 11.22 | H |
| | 2509.80 | -39.54 | 3.59 | 3.00 | 10.77 | -32.36 | -13.00 | 19.36 | H |
| | 1673.20 | -31.92 | 3.14 | 3.00 | 9.61 | -25.45 | -13.00 | 12.45 | V |
| | 2509.80 | -36.84 | 3.59 | 3.00 | 10.77 | -29.66 | -13.00 | 16.66 | V |
| 251 | 1697.60 | -29.96 | 3.26 | 3.00 | 9.77 | -23.45 | -13.00 | 10.45 | H |
| | 2546.40 | -37.41 | 3.69 | 3.00 | 10.89 | -30.21 | -13.00 | 17.21 | H |
| | 1697.60 | -31.09 | 3.26 | 3.00 | 9.77 | -24.58 | -13.00 | 11.58 | V |
| | 2546.40 | -39.07 | 3.69 | 3.00 | 10.89 | -31.87 | -13.00 | 18.87 | V |

PCS1900

| Channel | Frequency (MHz) | P _{Mea} (dBm) | P _{cl} (dB) | Diatance | G _a Antenna Gain(dB) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|---------|-----------------|------------------------|----------------------|----------|---------------------------------|-----------------|-------------|-------------|--------------|
| 512 | 3700.40 | -37.78 | 4.25 | 3.00 | 12.34 | -29.69 | -13.00 | 16.69 | H |
| | 5550.60 | -43.33 | 4.97 | 3.00 | 13.52 | -34.78 | -13.00 | 21.78 | H |
| | 3700.40 | -37.45 | 4.25 | 3.00 | 12.34 | -29.36 | -13.00 | 16.36 | V |
| | 5550.60 | -45.39 | 4.97 | 3.00 | 13.52 | -36.84 | -13.00 | 23.84 | V |
| 661 | 3760.00 | -37.37 | 4.38 | 3.00 | 12.34 | -29.41 | -13.00 | 16.41 | H |
| | 5640.00 | -44.78 | 5.01 | 3.00 | 13.58 | -36.21 | -13.00 | 23.21 | H |
| | 3760.00 | -37.28 | 4.38 | 3.00 | 12.34 | -29.32 | -13.00 | 16.32 | V |
| | 5640.00 | -45.04 | 5.01 | 3.00 | 13.58 | -36.47 | -13.00 | 23.47 | V |
| 810 | 3819.60 | -39.14 | 4.49 | 3.00 | 12.45 | -31.18 | -13.00 | 18.18 | H |
| | 5729.40 | -45.13 | 5.26 | 3.00 | 13.66 | -36.73 | -13.00 | 23.73 | H |
| | 3819.60 | -38.52 | 4.49 | 3.00 | 12.45 | -30.56 | -13.00 | 17.56 | V |
| | 5729.40 | -44.58 | 5.26 | 3.00 | 13.66 | -36.18 | -13.00 | 23.18 | V |

Remark:

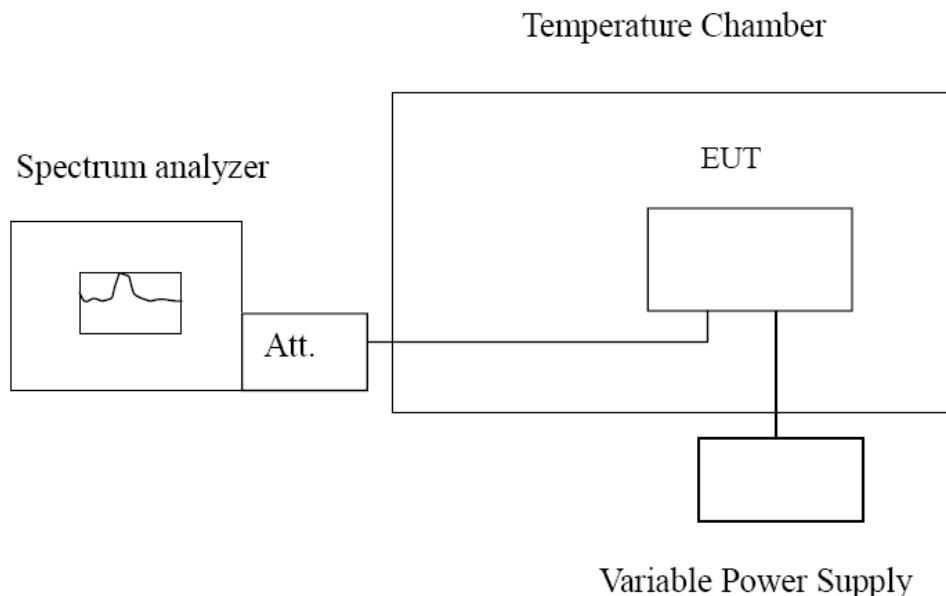
1. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + G_a(dBi)$
2. We were not recorded other points as values lower than limits.
3. Margin = Limit - EIRP

3.5 Frequency Stability under Temperature & Voltage Variations

LIMIT

Cellular Band: $\pm 2.5\text{ppm}$ PCS Band: Within the authorized frequency block

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Frequency Stability under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

TEST RESULTS

| Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz | | | | | |
|---|--------------------|-----------------|-------|-------------|--------|
| Voltage (V) | Temperature (°C) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 74 | 0.088 | 2.5 | Pass |
| | -20 | 65 | 0.078 | | |
| | -10 | 68 | 0.081 | | |
| | 0 | 32 | 0.038 | | |
| | 10 | 55 | 0.066 | | |
| | 20 | 31 | 0.037 | | |
| | 30 | 48 | 0.057 | | |
| | 40 | 65 | 0.078 | | |
| | 50 | 57 | 0.068 | | |
| 4.25 | 25 | 78 | 0.093 | | |
| End point 3.40 | 25 | 84 | 0.100 | | |

| Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz | | | | | |
|---|--------------------|-----------------|-------|---------------------------------------|--------|
| Voltage (V) | Temperature (°C) | Frequency error | | Limit (ppm) | Result |
| | | Hz | ppm | | |
| 3.70 | -30 | 68 | 0.036 | Within the authorized frequency block | Pass |
| | -20 | 59 | 0.031 | | |
| | -10 | 45 | 0.024 | | |
| | 0 | 87 | 0.046 | | |
| | 10 | 69 | 0.037 | | |
| | 20 | 73 | 0.039 | | |
| | 30 | 85 | 0.045 | | |
| | 40 | 69 | 0.037 | | |
| | 50 | 78 | 0.041 | | |
| 4.25 | 25 | 66 | 0.035 | | |
| End point 3.40 | 25 | 58 | 0.031 | | |

4 Test Setup Photos of the EUT

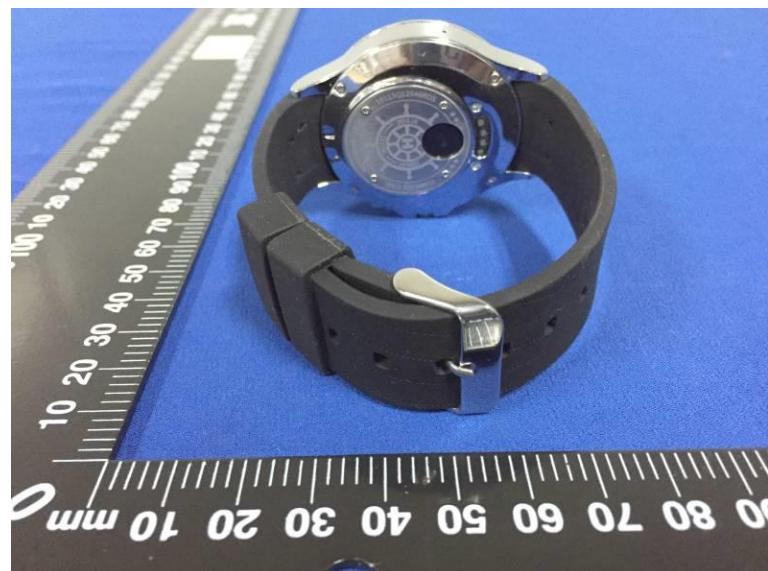


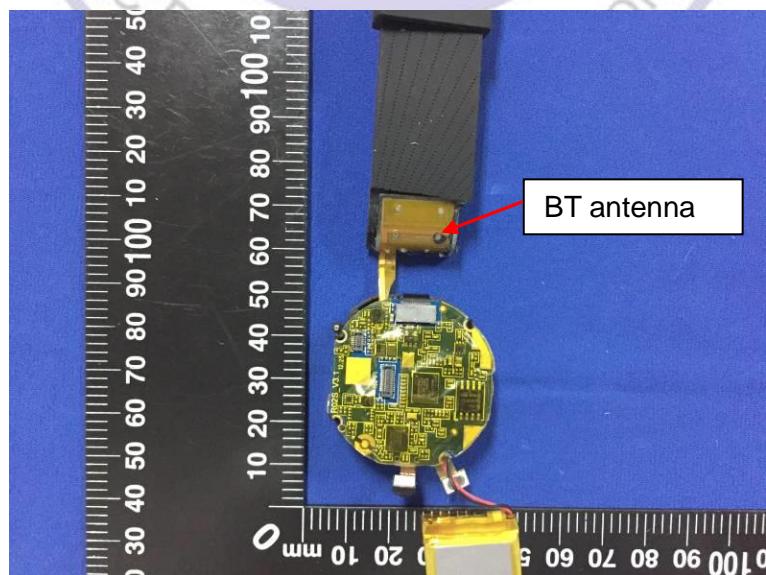
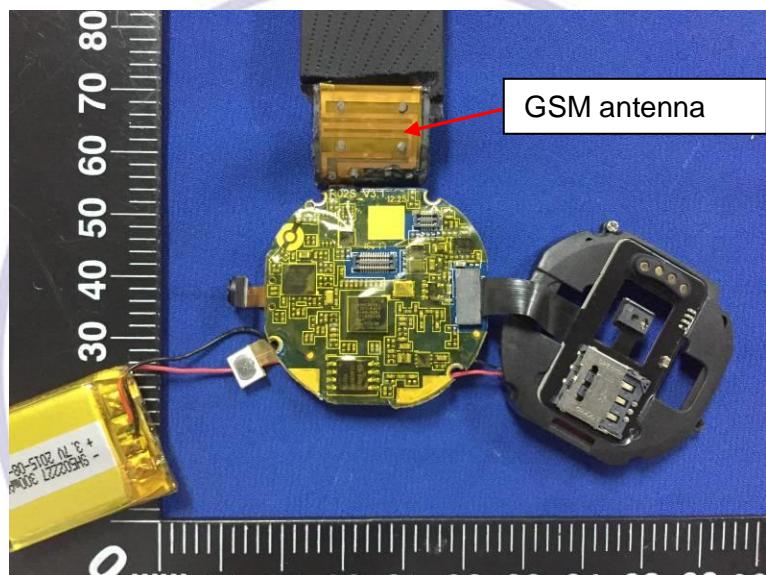
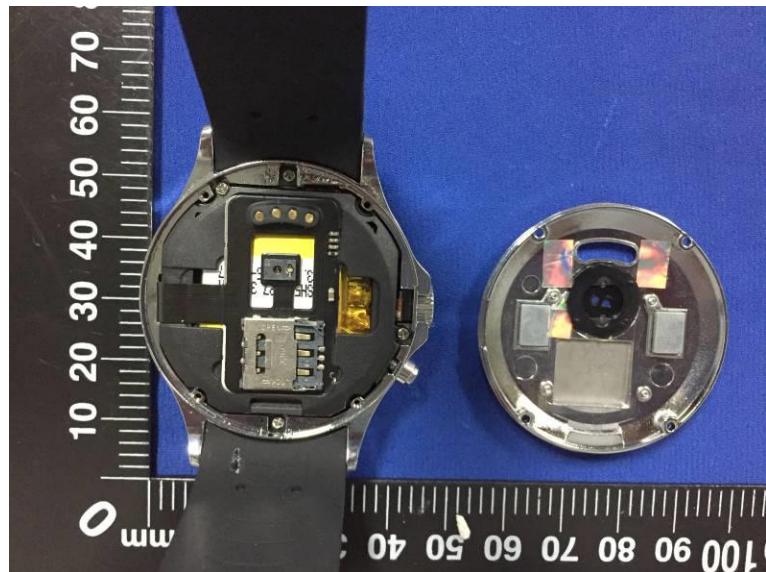
5 External and Internal Photos of the EUT

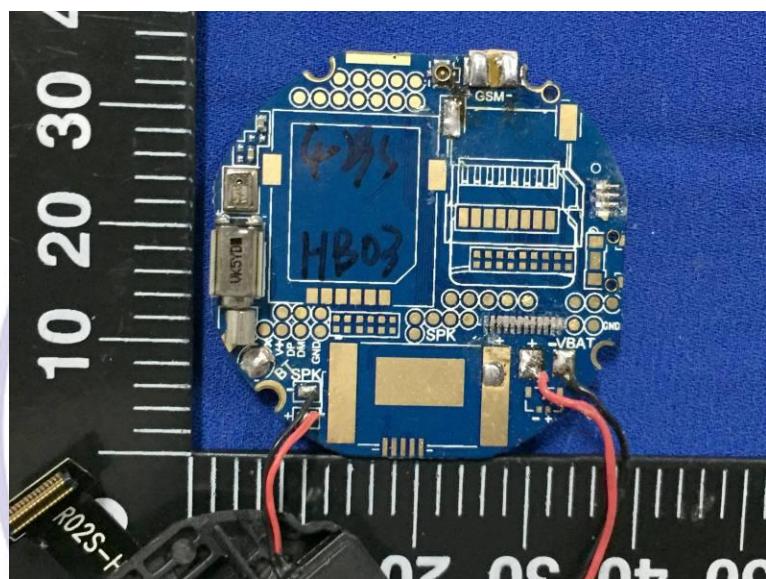
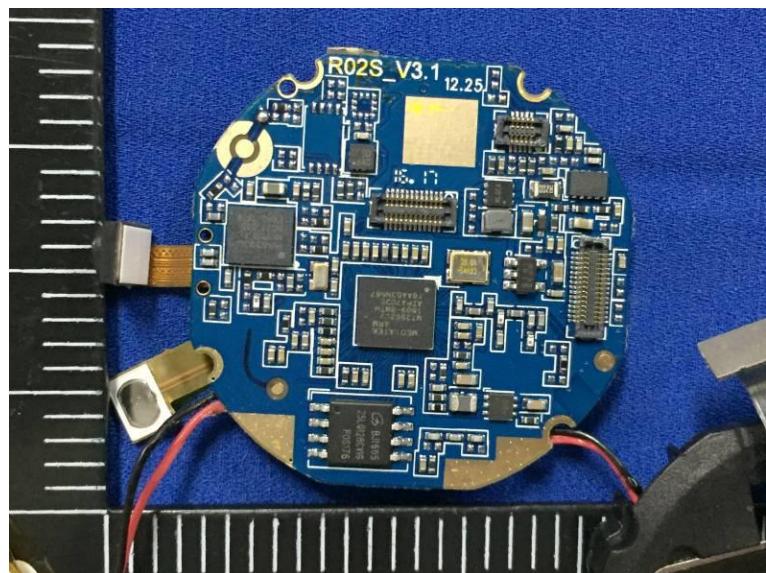
External Photos of EUT







Internal Photos of EUT



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