Shenzhen CTL Testing Technology Co., Ltd.
Tel: +86-755-89486194 Fax: +86-755-26636041

# FCC PART 22 AND PART 24 TEST REPORT

## FCC Part 22 Subpart H / Part 24 Subpart E

| | |
|---|---|
| **Report Reference No**.....: | **CTL1412163034-WU** |
| Compiled by<br>( position+printed name+signature)..: | File administrators Jacky Chen |
| Name of the organization performing the tests<br>( position+printed name+signature)..: | Test Engineer Happy Guo |
| Approved by<br>( position+printed name+signature)..: | Manager Tracy Qi |
| Date of issue.....: | Jan. 21, 2015 |
| **Test Firm**.....: | **Shenzhen CTL Testing Technology Co., Ltd.** |
| Address.....: | Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055 |
| **Applicant's name**.....: | **Dongguan Aoke Electronic Co., Ltd.** |
| Address.....: | No. 826, Meijing Middle Rd., Dalang Town, Dongguan, Guangdong, China(Mainland) |
| **Test specification:** | |
| Standard .....: | **FCC CFR Title 47 Part 2, Part 22H and Part 24E**<br>**EIA/TIA 603-C: 2004** |
| Master TRF.....: | Dated 2011-01 |



| | |
|---|---|
| **Test item description ..... :** | **Smart watch** |
| **FCC ID……..:** | **2AD4JGOLDKEYC320** |
| Trade Mark .....: | GoldKey |
| Model/Type reference.....: | GoldKey C320 (AK-S8) |
| **GSM** | |
| Transmit .....: | GSM 850: 824~849MHz, PCS 1900: 1850~1910MHz |
| Receive .....: | GSM 850: 869~894MHz, PCS 1900: 1930~1990MHz |
| Release Version .....: | R99 |
| Type of modulation .....: | GMSK for GSM/GPRS |
| GPRS Type .....: | Class B |
| GPRS Class .....: | Class 12 |
| **3G** | |
| Support Networks | WCDMA |
| Support Band | WCDMA Band I 2100MHz |
| Type of Modulation | QPSK |
| **GPS** | |

| | |
|---|---|
| work frequency .....: | 1575.42MHz |
| Type of modulation .....: | BPSK |
| **Bluetooth** | |
| Work frequency .....: | 2402~2480MHz |
| Version.....: | V3.0, V4.0 |
| Type of modulation .....: | FHSS |
| Data Rate.....: | 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps(8DPSK) |
| **Wi-Fi** | |
| Work frequency .....: | 802.11b/g/n(20MHz): 2412~2462MHz |
| | 802.11n(40MHz): 2422~2452MHz |
| Type of modulation .....: | 802.11b DSSS, 802.11g/n: OFDM |
| Data Rate.....: | 802.11b: 1/2/5.5/11 Mbps |
| | 802.11g: 6/9/12/18/24/36/48/54 Mbps |
| | 802.11n: up to 150 Mbps |
| Antenna Gain .....: | 1.0dBi for GSM850 |
| | 0 dBi for PCS1900 |
| | -1.0 dBi for Bluetooth and Wi-Fi |
| Antenna type .....: | Internal |
| Harware version .....: | MOLY.WR8.W1315.MD.WG.MP.V4 |
| Software version.....: | 3.4.67 |
| Result.....: | **Positive** |

*The EUT is only support WCDMA Band I and cannot use 3G function in USA, only use 2G in USA market.*

# TEST REPORT

| Test Report No. : | CTL1412263034-WU | Jan. 21, 2015<br>Date of issue |
|---|---|---|

| | | |
|---|---|---|
| Equipment under Test | : | Smart watch |
| Model /Type | : | GoldKey C320 (AK-S8) |
| **Applicant** | : | **Dongguan Aoke Electronic Co., Ltd.** |
| Address | : | No. 826, Meijing Middle Rd., Dalang Town, Dongguan, Guangdong, China(Mainland) |
| **Manufacturer** | : | **Dongguan Aoke Electronic Co., Ltd.** |
| Address | : | No. 826, Meijing Middle Rd., Dalang Town, Dongguan, Guangdong, China(Mainland) |

| | |
|---|---|
| **Test Result** according to the standards on page 5: | **Positive** |

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.

# Contents

# 1. TEST STANDARDS

The tests were performed according to following standards:

**FCC Part 22 Subpart H:** Public Mobile Services

**FCC Part 24 Subpart E:** Personal Communications Services

**EIA/TIA 603-C: 2004**

**FCC CFR Title 47 Part 2**

# 2. SUMMARY

## 2.1. General Remarks

Date of receipt of test sample : Dec. 20, 2014

Testing commenced on : Dec. 20, 2014

Testing concluded on : Jan. 21, 2015

## 2.2. Equipment Under Test

### Power supply system utilised

Power supply voltage : o 120V / 60 Hz o 115V / 60Hz
o 12 V DC o 24 V DC
● Other (specified in blank below)

DC 3.7V from battery

## 2.3. Short description of the Equipment under Test (EUT)

A Smart watch with GSM/WCDMA, Wi-Fi, Bluetooth, GPRS and GPS function.

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

Serial number: Prototype

## 2.4. EUT operation mode

CTL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

| Test Mode |
|---|
| Mode 1: GSM850 |
| Mode 2: PCS1900 |
| Mode 3: GPRS850 |
| Mode 4: GPRS1900 |
| Mode 5: EDGE850 |
| Mode 6: EDGE1900 |

Note:
1. 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.
2. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.
3. Radiated power output working at GSM link was higher than that working at GPRS link, so all of test items were done working at GSM mode. Refer to peak power output for more details.

## 2.5. EUT configuration

**The following peripheral devices and interface cables were connected during the measurement:**

o - supplied by the manufacturer

● - supplied by the lab

| | | |
|---|---|---|
| o | Manufacturer : | |
| | Model No. : | |
| o | Manufacturer : | |
| | Model No. : | |

## 2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AD4JGOLDKEYC320 filing to comply with of the FCC Part 22 and Part 24 Rules.

## 2.7. Modifications

No modifications were implemented to meet testing criteria.

# 3. TEST ENVIRONMENT

## 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.

## 3.2. Test Facility

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.

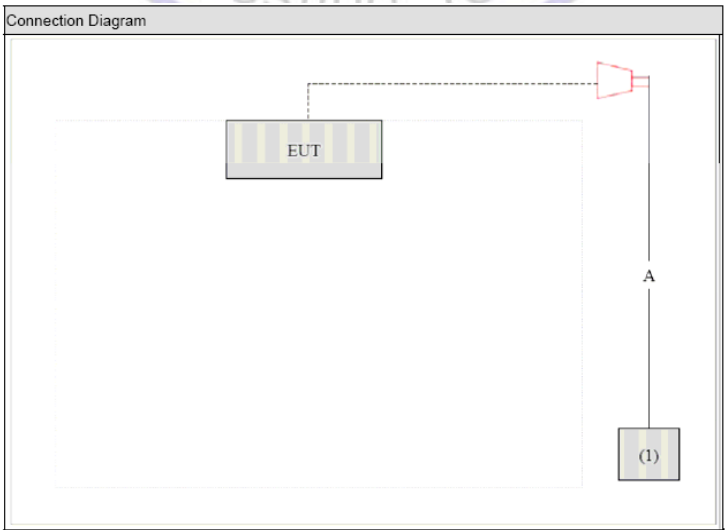
## 3.3. Environmental conditions

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

| | |
|---|---|
| Temperature: | 15-35 ° C |
| Humidity: | 30-60 % |
| Atmospheric pressure: | 950-1050mbar |

## 3.4. Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**




| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | Coaxial Cable | Shielded, >5m |

## 3.5. EUT Exercise Software

1. Setup the EUT and simulators as shown on above.
2. Turn on the power of all equipment.
3. EUT Communicate with CMU200, then select channel to test.

## 3.6. 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.

## 3.7. Equipments Used during the Test

| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Bilog Antenna | Sunol Sciences Corp. | JB1 | A061713 | 2014/07/12 | 2015/07/11 |
| EMI Test Receiver | R&S | ESCI | 103710 | 2014/07/10 | 2015/07/09 |
| Spectrum Analyzer | Agilent | E4407B | MY45108355 | 2014/07/06 | 2015/07/05 |
| Controller | EM Electronics | Controller EM 1000 | N/A | 2014/07/06 | 2015/07/05 |
| Horn Antenna | Sunol Sciences Corp. | DRH-118 | A062013 | 2014/07/12 | 2015/07/11 |
| Horn Antenna | SCHWARZBECK | BBHA9170 | 1562 | 2014/07/12 | 2015/07/11 |
| Active Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-037 | 2014/07/12 | 2015/07/11 |
| LISN | R&S | ENV216 | 101316 | 2014/07/10 | 2015/07/09 |
| LISN | SCHWARZBECK | NSLK8127 | 8127687 | 2014/07/10 | 2015/07/09 |
| Microwave Preamplifier | HP | 8349B | 3155A00882 | 2014/07/10 | 2015/07/09 |
| Amplifier | HP | 8447D | 3113A07663 | 2014/07/10 | 2015/07/09 |
| Transient Limiter | Com-Power | LIT-153 | 532226 | 2014/07/10 | 2015/07/09 |
| Radio Communication Tester | R&S | CMU200 | 3655A03522 | 2014/07/06 | 2015/07/05 |
| Temperature/Humidity Meter | zhicheng | ZC1-2 | 22522 | 2014/07/10 | 2015/07/09 |
| SIGNAL GENERATOR | HP | 8647A | 3200A00852 | 2014/07/10 | 2015/07/09 |
| Wideband Peak Power Meter | Anritsu | ML2495A | 220.23.35 | 2014/07/06 | 2015/07/05 |
| Power Sensor | Anritsu | MA2411B | 0738552 | 2014/07/06 | 2015/07/05 |
| Climate Chamber | ESPEC | EL-10KA | A20120523 | 2014/07/06 | 2015/07/05 |
| High-Pass Filter | K&L | 9SH10-2700/X12750-O/O | / | 2014/07/06 | 2015/07/05 |
| High-Pass Filter | K&L | 41H10-1375/U12750-O/O | / | 2014/07/06 | 2015/07/05 |
| RF Cable | HUBER+SUHNER | RG214 | / | 2014/07/09 | 2015/07/08 |

## 3.8. Summary of Test Result

No deviations from the test standards

For GSM 850 (FCC Part 22H & Part 2)

| Emission | | | |
|---|---|---|---|
| Performed Item | Normative References | Test Performed | Deviation |
| Peak Output Power | FCC Part 22.913(a)(2) and Part 2.1046<br>EIA/TIA 603-C | Yes | No |
| Modulation Characteristic | FCC Part 2.1047(d) | Yes | No |
| Occupied Bandwidth | FCC Part 2.1049 | Yes | No |
| Spurious Emission At Antenna Terminals (+/- 1MHz) | FCC Part 22.917(a) and Part 2.1049 | Yes | No |
| Spurious Emission | FCC Part 22.917(b) and Part 2.1051, 2.1053<br>EIA/TIA 603-C | Yes | No |
| Frequency Stability Under Temperature & Voltage Variations | FCC Part 22.355 and 2.1055<br>EIA/TIA 603-C | Yes | No |

For PCS 1900 (FCC Part 24E & Part 2)

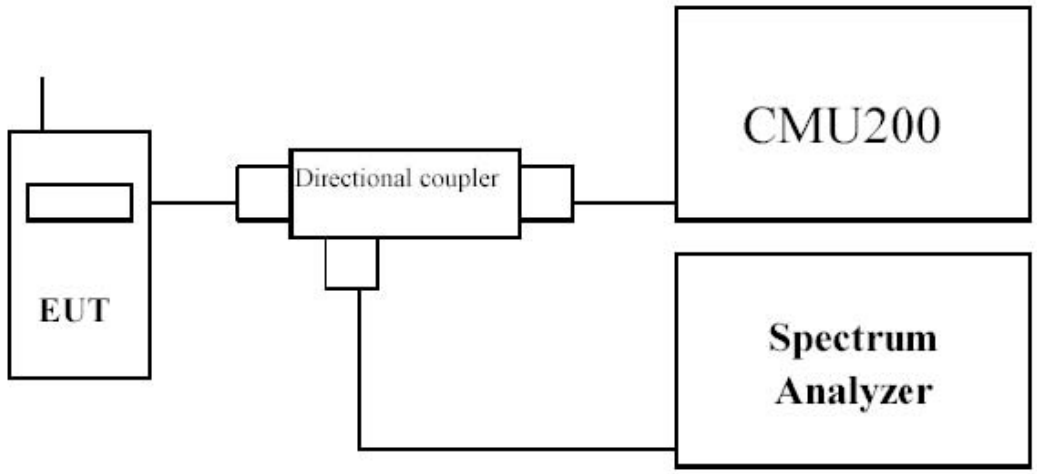
| Emission | | | |
|---|---|---|---|
| Performed Item | Normative References | Test Performed | Deviation |
| Peak Output Power | FCC Part 24.232(b) and Part 2.1046<br>EIA/TIA 603-C | Yes | No |
| Modulation Characteristic | FCC Part 2.1047(d) | Yes | No |
| Occupied Bandwidth | FCC Part 24.238(b) and Part 2.1049 | Yes | No |
| Spurious Emission At Antenna Terminals (+/- 1MHz) | FCC Part 24.238(a) and Part 2.1049 | Yes | No |
| Spurious Emission | FCC Part 24.238(b) and Part 2.1051, 2.1053<br>EIA/TIA 603-C | Yes | No |
| Frequency Stability Under Temperature & Voltage | FCC Part 24.235 and 2.1055<br>EIA/TIA 603-C | Yes | No |

# 4. TEST CONDITIONS AND RESULTS

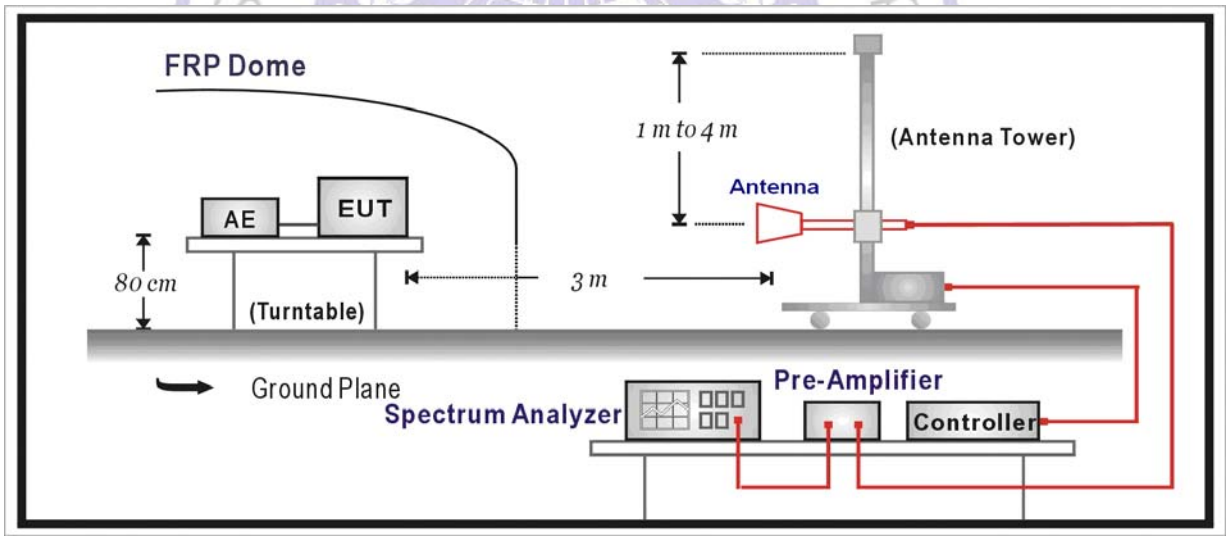
## 4.1. Peak Output Power

**TEST CONFIGURATION**

Conducted Power Measurement:




Radiated Power Measurement:




**TEST PROCEDURE**

The EUT was setup according to EIA/TIA 603C

**Conducted Power Measurement:**

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

**Radiated Power 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) Test site anechoic chamber refer to ANSI C63.4: 2003.

**Base station simulator settings for each test mode:**

1. For GSM/GPRS
   Configure R&S CMU200 to support GMSK and 8PSK call respectively, and set one timeslot transmission for GMSK GSM/GPRS and 8PSK EDGE.
   Measure and record power outputs for both modulations.

**LIMIT**

For FCC Part 22.913(a)(2):

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC Part 24.232(b):

The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 2 Watts.

**TEST RESULTS**

GSM850

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 128 | 824.2 | GMSK | 32.44 | 28.84 | 38.50 |
| 189 | 836.4 | GMSK | 33.16 | 29.33 | 38.50 |
| 251 | 848.8 | GMSK | 32.71 | 30.07 | 38.50 |

PCS1900

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | EIRP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 512 | 1850.2 | GMSK | 29.80 | 30.01 | 33.00 |
| 661 | 1880.0 | GMSK | 29.72 | 29.75 | 33.00 |
| 810 | 1909.8 | GMSK | 29.52 | 29.44 | 33.00 |

Note: The maximum PAR for PCS1900 is 7.9dB less than 13 dB.

GPRS850 1TX slot

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 128 | 824.2 | GMSK | 32.39 | 28.65 | 38.50 |
| 189 | 836.4 | GMSK | 33.06 | 28.49 | 38.50 |
| 251 | 848.8 | GMSK | 32.70 | 29.94 | 38.50 |

GPRS1900 1TX slot

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | EIRP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 512 | 1850.2 | GMSK | 29.78 | 29.89 | 33.00 |
| 661 | 1880.0 | GMSK | 29.70 | 29.63 | 33.00 |
| 810 | 1909.8 | GMSK | 29.48 | 29.31 | 33.00 |

Note: The maximum PAR for GPRS1900 is 8.2dB less than 13 dB.

EDGE850 1TX slot

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 128 | 824.2 | 8PSK | 27.02 | 26.77 | 38.50 |
| 189 | 836.4 | 8PSK | 27.24 | 26.83 | 38.50 |
| 251 | 848.8 | 8PSK | 27.10 | 26.94 | 38.50 |

EDGE1900 1TX slot

| Channel No. | Frequency (MHz) | Modulation | Conducted Power (dBm) | EIRP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|
| 512 | 1850.2 | 8PSK | 25.28 | 26.06 | 33.00 |
| 661 | 1880.0 | 8PSK | 25.15 | 26.00 | 33.00 |
| 810 | 1909.8 | 8PSK | 25.35 | 25.91 | 33.00 |

Note: The maximum PAR for EDGE1900 is 8.8dB less than 13 dB.

Radiated Measurement

GSM850

| Frequency (MHz) | SA Reading (dBm) | Ant. Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 128 (824.20MHz) | | | | | | | | |
| 824.2 | -14.48 | H | 19.28 | 1.76 | -0.02 | 17.50 | 38.50 | -21.00 |
| 824.2 | -3.88 | V | 30.62 | 1.76 | -0.02 | 28.84 | 38.50 | -9.66 |
| Middle Channel 189 (836.40MHz) | | | | | | | | |
| 836.4 | -15.10 | H | 18.92 | 1.75 | 0.10 | 17.27 | 38.50 | -21.23 |
| 836.4 | -3.78 | V | 30.98 | 1.75 | 0.10 | 29.33 | 38.50 | -9.17 |
| High Channel 251 (848.80MHz) | | | | | | | | |
| 848.8 | -15.10 | H | 18.92 | 1.78 | 0.13 | 17.27 | 38.50 | -21.23 |
| 848.8 | -2.89 | V | 31.72 | 1.78 | 0.13 | 30.07 | 38.50 | -8.43 |

PCS1900

| Frequency (MHz) | SA Reading (dBm) | Ant .Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 512 (1850.20MHz) | | | | | | | | |
| 1850.2 | 23.69 | H | 22.29 | 2.68 | 10.40 | 30.01 | 33.00 | -2.99 |
| 1850.2 | 13.38 | V | 11.79 | 2.68 | 10.40 | 19.51 | 33.00 | -13.49 |
| Middle Channel 661 (1880.00MHz) | | | | | | | | |
| 1880.0 | 23.50 | H | 22.00 | 2.68 | 10.43 | 29.75 | 33.00 | -3.25 |
| 1880.0 | 13.36 | V | 11.52 | 2.68 | 10.43 | 19.27 | 33.00 | -13.73 |
| High Channel 810 (1909.80MHz) | | | | | | | | |
| 1909.8 | 23.05 | H | 21.70 | 2.70 | 10.44 | 29.44 | 33.00 | -3.56 |
| 1909.8 | 12.48 | V | 10.68 | 2.70 | 10.44 | 18.42 | 33.00 | -14.58 |

GPRS850 1TX slot

| Frequency (MHz) | SA Reading (dBm) | Ant. Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 128 (824.20MHz) | | | | | | | | |
| 824.2 | -14.83 | H | 18.93 | 1.76 | -0.02 | 17.15 | 38.50 | -21.35 |
| 824.2 | -4.07 | V | 30.43 | 1.76 | -0.02 | 28.65 | 38.50 | -9.85 |
| Middle Channel 189 (836.40MHz) | | | | | | | | |
| 836.4 | -16.32 | H | 17.57 | 1.75 | 0.10 | 15.92 | 38.50 | -22.58 |
| 836.4 | -4.39 | V | 30.38 | 1.75 | 0.10 | 28.73 | 38.50 | -9.77 |
| High Channel 251 (848.80MHz) | | | | | | | | |
| 848.8 | -16.48 | H | 17.54 | 1.78 | 0.13 | 15.89 | 38.50 | -22.61 |
| 848.8 | -3.02 | V | 31.59 | 1.78 | 0.13 | 29.94 | 38.50 | -8.56 |

GPRS1900 1TX slot

| Frequency (MHz) | SA Reading (dBm) | Ant .Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 512 (1850.20MHz) | | | | | | | | |
| 1850.2 | 23.57 | H | 22.17 | 2.68 | 10.40 | 29.89 | 33.00 | -3.11 |
| 1850.2 | 12.88 | V | 11.29 | 2.68 | 10.40 | 19.01 | 33.00 | -13.99 |
| Middle Channel 661 (1880.00MHz) | | | | | | | | |
| 1880.0 | 23.38 | H | 21.88 | 2.68 | 10.43 | 29.63 | 33.00 | -3.37 |
| 1880.0 | 13.21 | V | 11.37 | 2.68 | 10.43 | 19.12 | 33.00 | -13.88 |
| High Channel 810 (1909.80MHz) | | | | | | | | |
| 1909.8 | 22.92 | H | 21.57 | 2.70 | 10.44 | 29.31 | 33.00 | -3.51 |
| 1909.8 | 11.83 | V | 10.04 | 2.70 | 10.44 | 17.78 | 33.00 | -15.22 |

EDGE 850 1TX slot

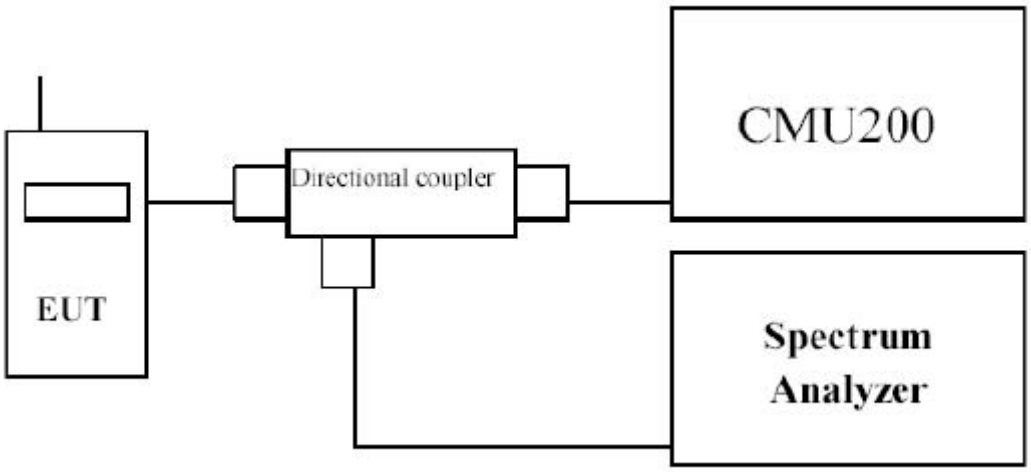
| Frequency (MHz) | SA Reading (dBm) | Ant. Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBd) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 128 (824.20MHz) | | | | | | | | |
| 824.2 | -16.93 | H | 16.82 | 1.76 | -0.02 | 15.04 | 38.50 | -23.46 |
| 824.2 | -5.94 | V | 28.55 | 1.76 | -0.02 | 26.77 | 38.50 | -11.73 |
| Middle Channel 189 (836.40MHz) | | | | | | | | |
| 836.4 | -17.33 | H | 16.56 | 1.75 | 0.10 | 14.91 | 38.50 | -23.59 |
| 836.4 | -6.28 | V | 28.48 | 1.75 | 0.10 | 26.83 | 38.50 | -11.67 |
| High Channel 251 (848.80MHz) | | | | | | | | |
| 848.8 | -17.33 | H | 16.68 | 1.78 | 0.13 | 15.03 | 38.50 | -23.47 |
| 848.8 | -6.02 | V | 28.59 | 1.78 | 0.13 | 26.94 | 38.50 | -11.56 |

EDGE1900 1TX slot

| Frequency (MHz) | SA Reading (dBm) | Ant .Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 512 (1850.20MHz) | | | | | | | | |
| 1850.2 | 19.74 | H | 18.34 | 2.68 | 10.40 | 26.06 | 33.00 | -6.94 |
| 1850.2 | 9.98 | V | 8.39 | 2.68 | 10.40 | 16.11 | 33.00 | -16.89 |
| Middle Channel 661 (1880.00MHz) | | | | | | | | |
| 1880.0 | 19.75 | H | 18.25 | 2.68 | 10.43 | 26.00 | 33.00 | -7.00 |
| 1880.0 | 10.05 | V | 8.21 | 2.68 | 10.43 | 15.96 | 33.00 | -17.04 |
| High Channel 810 (1909.80MHz) | | | | | | | | |
| 1909.8 | 19.52 | H | 18.17 | 2.70 | 10.44 | 25.91 | 33.00 | -7.09 |
| 1909.8 | 8.55 | V | 6.76 | 2.70 | 10.44 | 14.50 | 33.00 | -18.50 |

## 4.2. Modulation Characteristic

**TEST CONFIGURATION**




**LIMIT**

N/A

**TEST PROCEDURE**

GMSK is a form of binary signaling schemes which represent digital states as a shift between discrete sinusoidal frequencies called Frequency Shift Keying (FSK). Minimum Shift Keying (MSK) is continuous phase FSK with the smallest possible modulation index h. Modulation index is defined as:
h = 2*F*Tb
where F = Peak frequency deviation in Hz and Tb = Bit period in seconds

Two discrete frequencies, representing two distinct digital states, with equal phases at switch time t = 0 requires a minimum value of h = 0.5. The Gaussian part of GMSK describes the fact that the digital pulses are filtered in the time domain. This results in bits which are sinusoidal rather than square. The effective spectrum is then compressed with the average carrier frequency in the center of the passband. This is a great advantage because of the significantly reduced bandwidth. GMSK is utilized because of these bandwidth conservation properties.

The bandwidth for GSM is a 60 MHz up-link at 1850-1910 MHz and down-link at 1930-1990 MHz. The 65 MHz is divided into 299 channels, each of which is 200 kHz wide. Slight spectral spillage is allowed into neighboring channels (which is minimized by GMSK). This separated transmit/receive frequencies scheme under GSM enables easier duplex filtering.

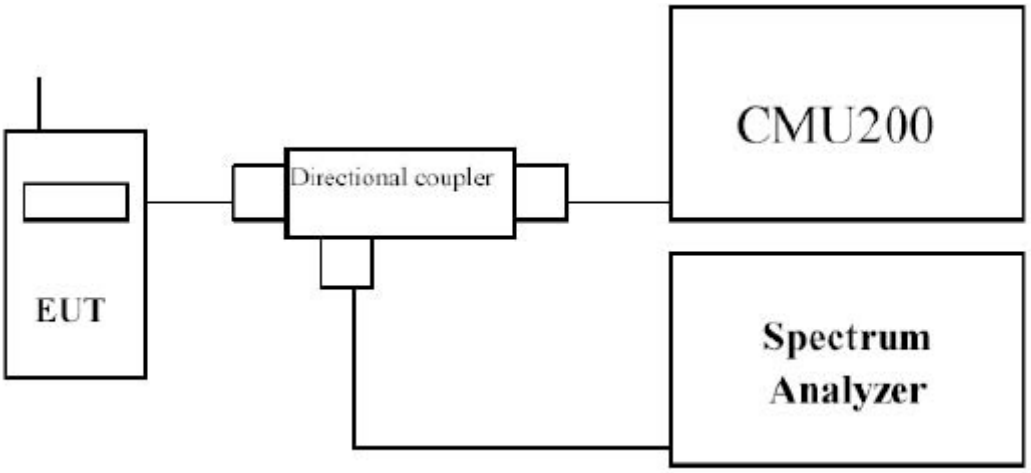
Within the bandwidth, individual channels are subdivided into multiframes (made of 26 frames), frames (made of 8 time slots), and time slots (made of 8 fields). The time slots are 0.57 ms long allowing 156.25 bits of information including overhead.

**TEST RESULTS**

The modulation of GSM was verified and confirmed compliance with requirement.

## 4.3. Occupied Bandwidth

**TEST CONFIGURATION**




**TEST PROCEDURE**

Using Occupied Bandwidth measurement function of spectrum analyzer, and setting as follows:

For GPRS/EDGE 850/1900 test --- RBW = 3 kHz and VBW = 10 kHz

For WCDMA FDD Band II/V test --- RBW = 50 kHz and VBW = 200 kHz

**LIMIT**

N/A

**TEST RESULTS**

| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Occupied Bandwidth | | |
| Test Mode | Mode 1: GSM 850 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-6 |

| Channel No. | Frequency (MHz) | -26dB Occupied Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|---|
| 128 | 824.20 | 312.40 | 245.65 |
| 189 | 836.40 | 311.33 | 250.75 |
| 251 | 848.80 | 310.36 | 246.16 |

**Figure Channel 128 (824.20MHz)**

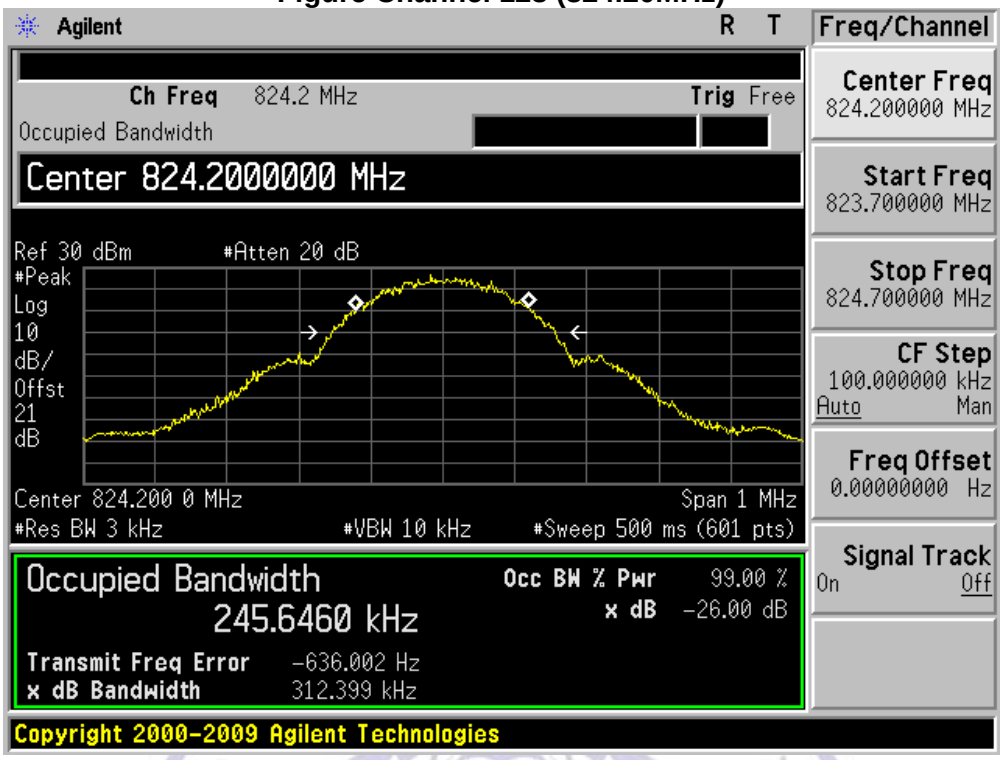



**Figure Channel 189 (836.40MHz)**

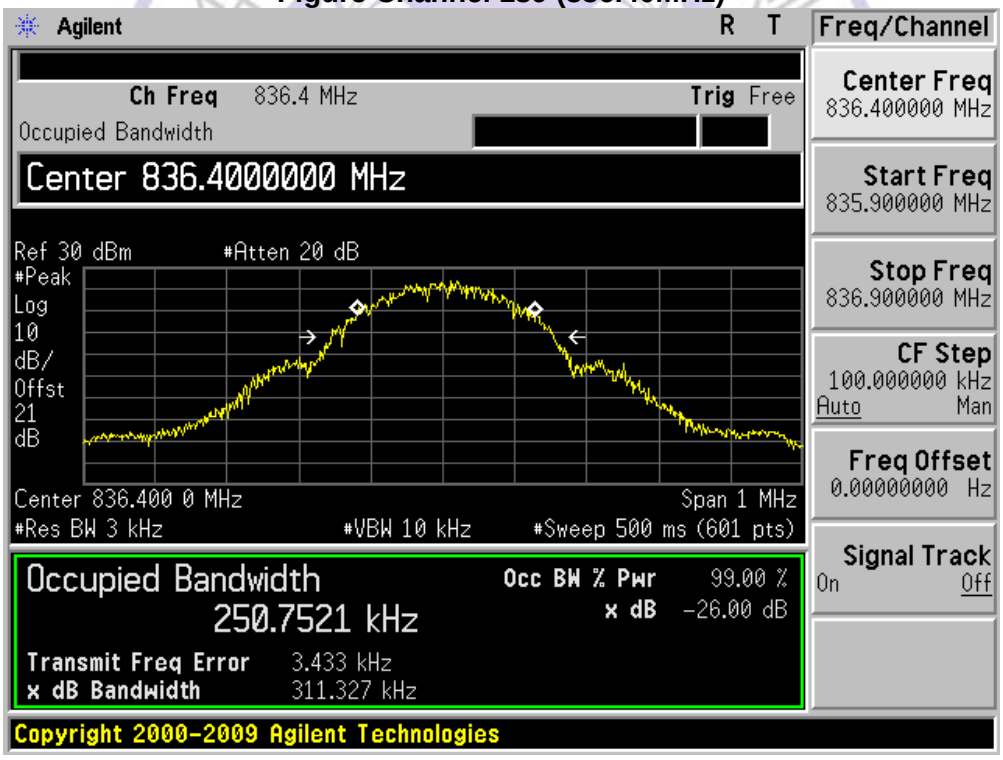
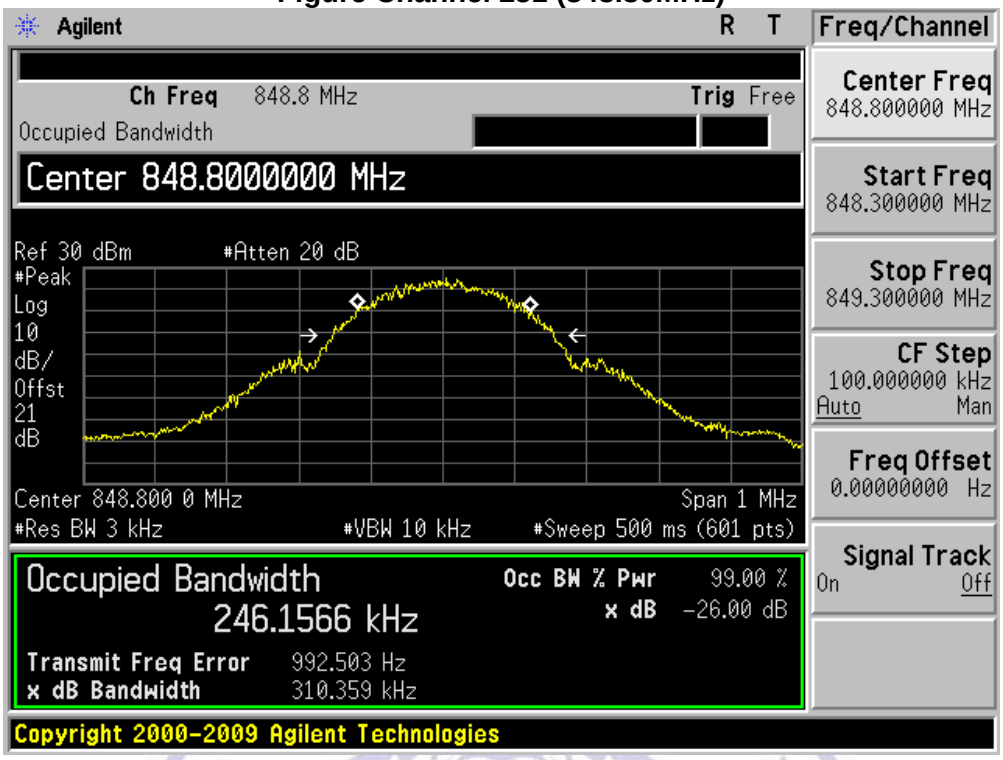


**Figure Channel 251 (848.80MHz)**



| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Occupied Bandwidth | | |
| Test Mode | Mode 2: PCS 1900 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-6 |

| Channel No. | Frequency (MHz) | -26dB Occupied Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|---|
| 512 | 1850.20 | 312.97 | 245.63 |
| 661 | 1880.00 | 310.29 | 244.80 |
| 810 | 1909.80 | 314.55 | 246.59 |

**Figure Channel 512 (1850.20MHz)**

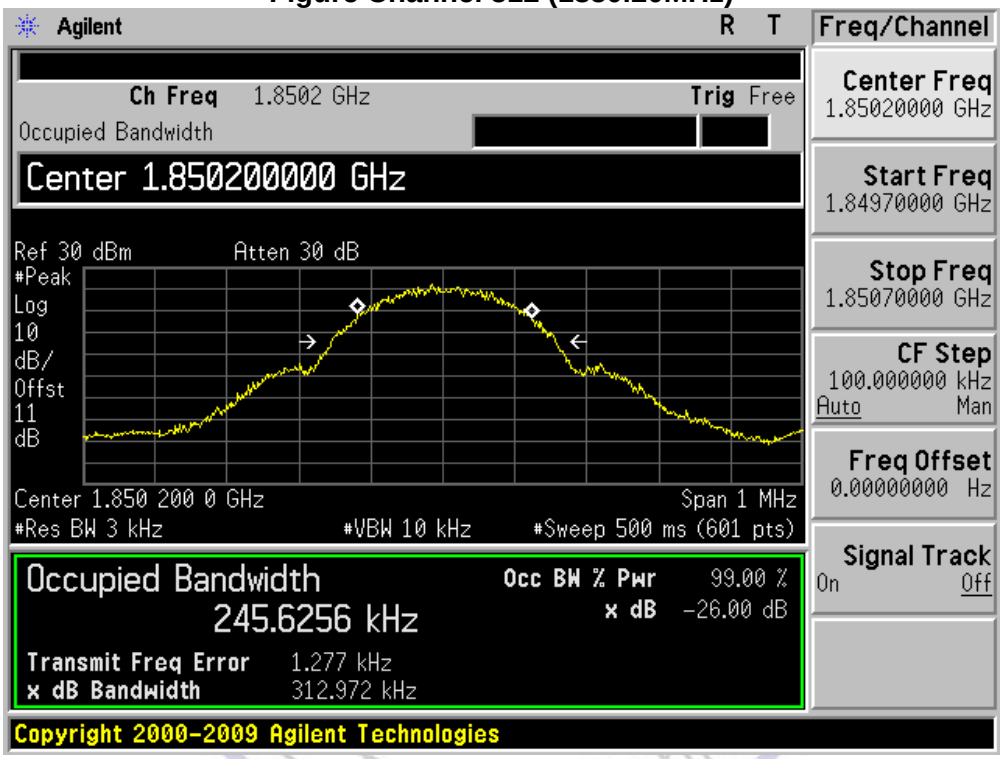


**Figure Channel 661 (1880.00MHz)**

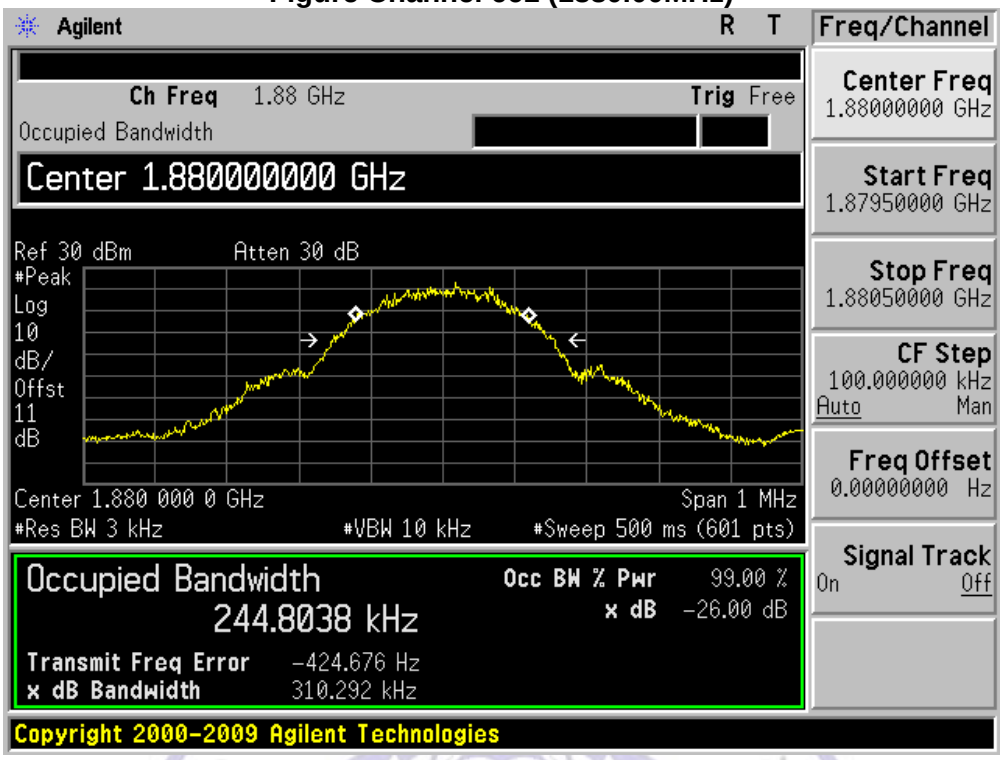
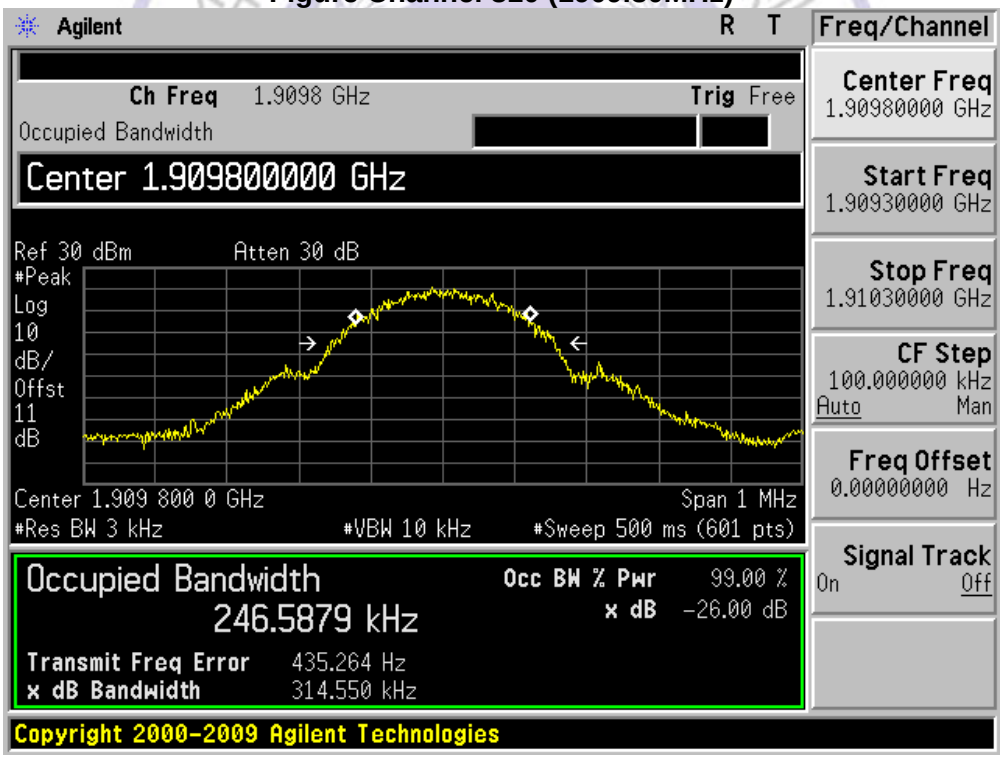



**Figure Channel 810 (1909.80MHz)**



| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Occupied Bandwidth | | |
| Test Mode | Mode 5: EDGE 850 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC6 |

| Channel No. | Frequency (MHz) | -26dB Occupied Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|---|
| 128 | 824.20 | 308.59 | 243.37 |
| 189 | 836.40 | 305.06 | 243.26 |
| 251 | 848.80 | 305.66 | 245.82 |

**Figure Channel 128 (824.20MHz)**

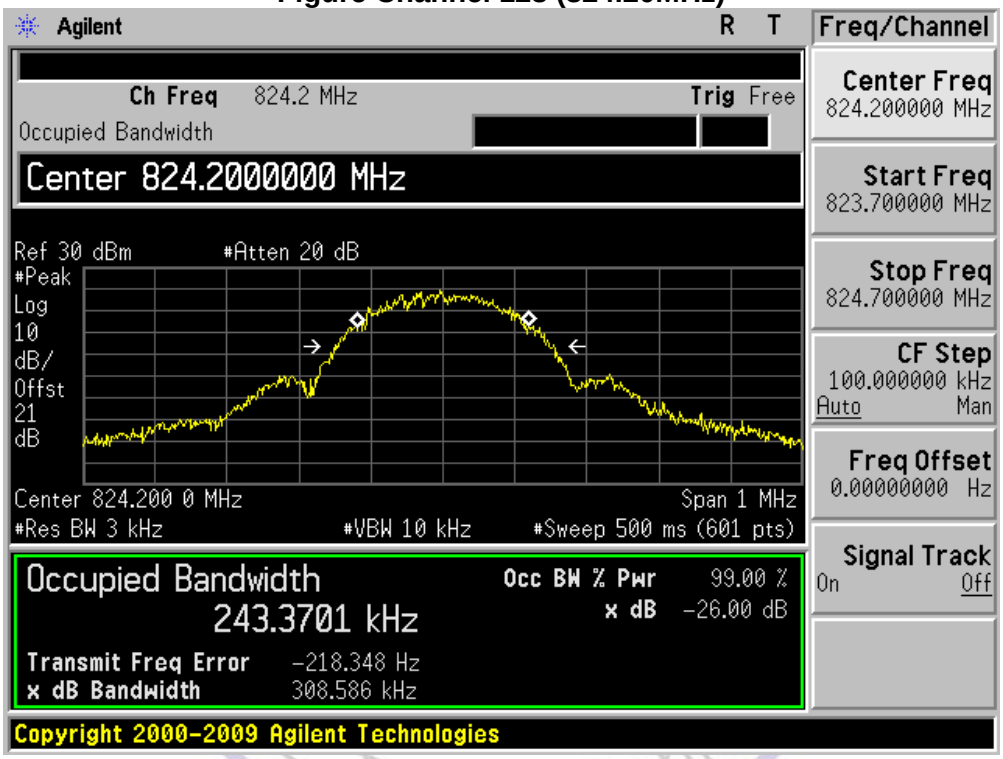


**Figure Channel 189 (836.40MHz)**

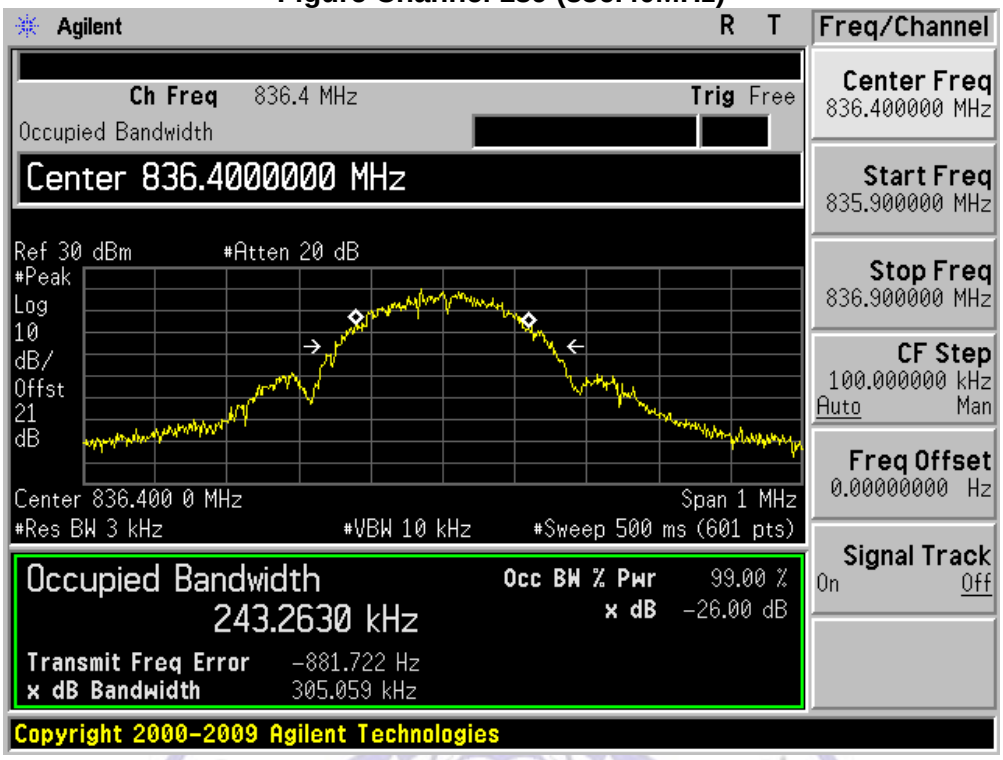
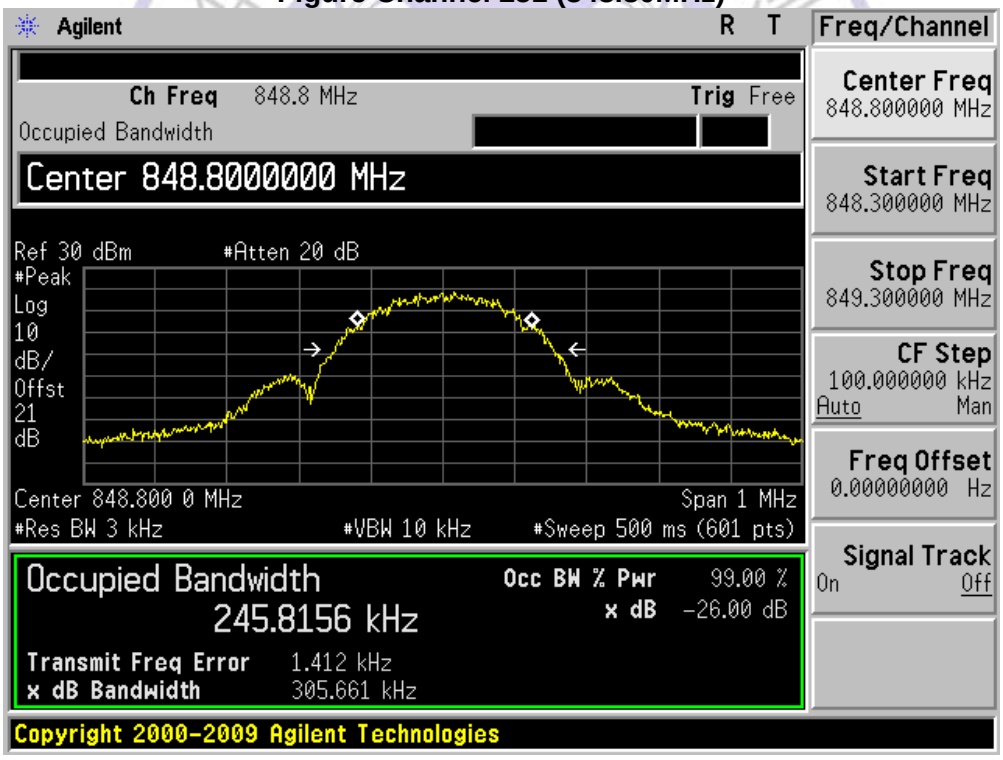



**Figure Channel 251 (848.80MHz)**



| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Occupied Bandwidth | | |
| Test Mode | Mode 6: EDGE 1900 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC6 |

| Channel No. | Frequency (MHz) | -26dB Occupied Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) |
|---|---|---|---|
| 512 | 1850.20 | 298.60 | 242.91 |
| 661 | 1880.00 | 31711 | 245.81 |
| 810 | 1909.80 | 308.28 | 245.27 |

**Figure Channel 512 (1850.20MHz)**

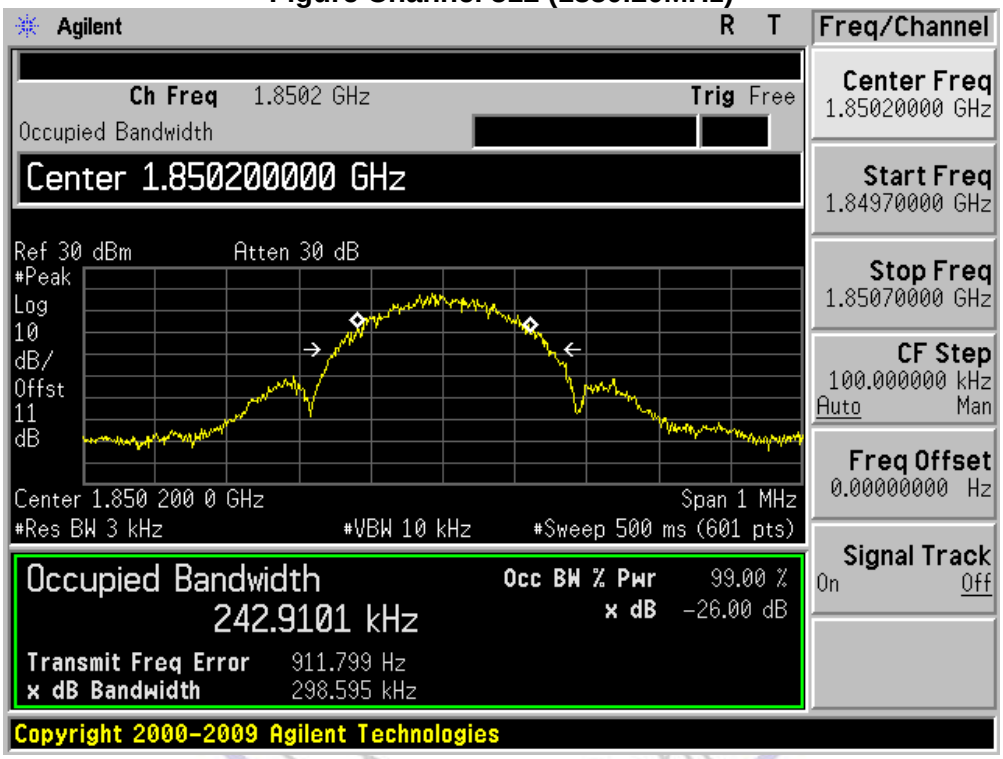


**Figure Channel 661 (1880.00MHz)**

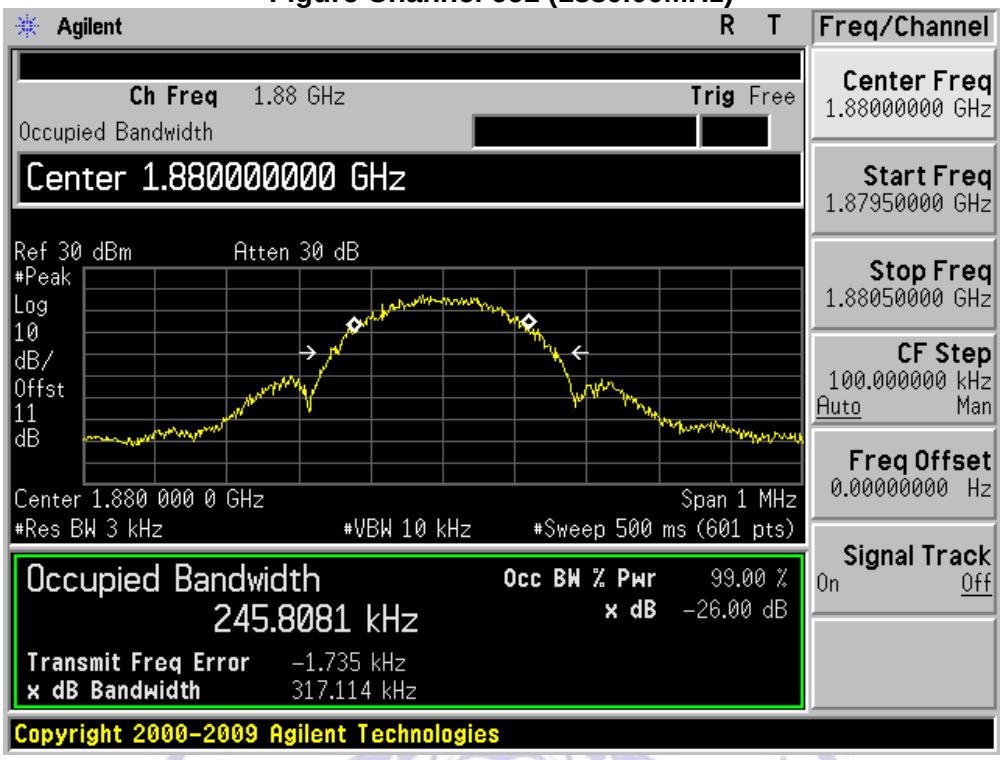
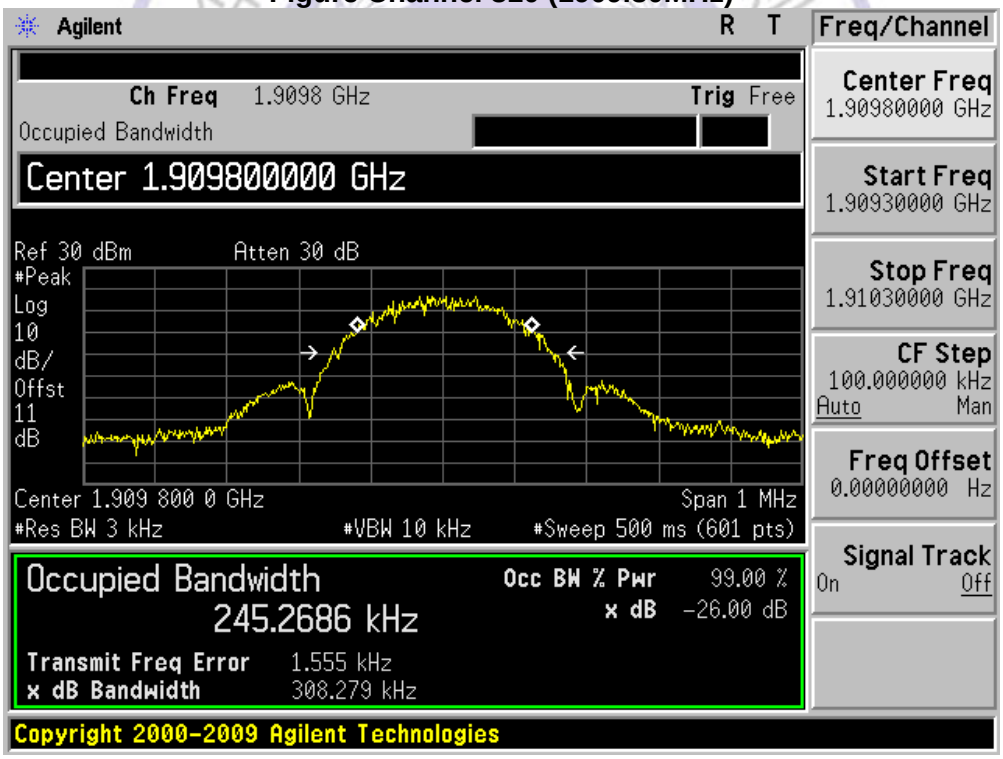
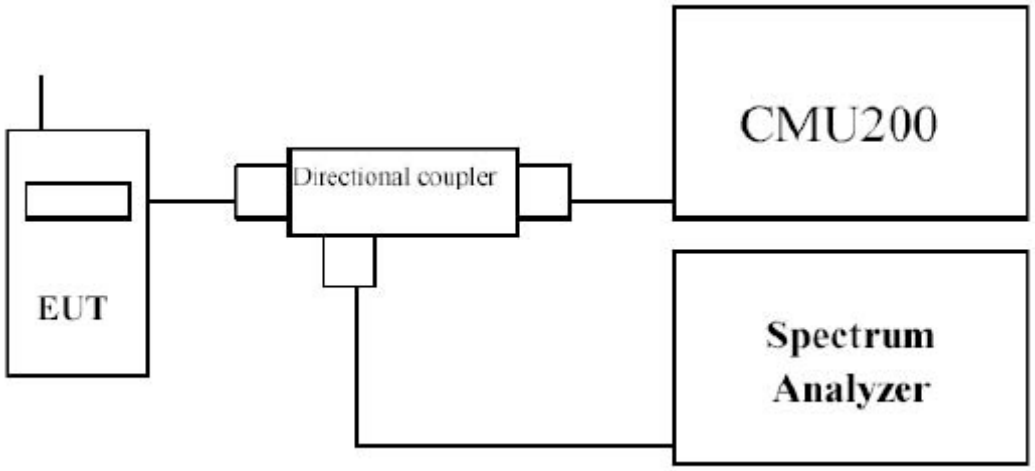



**Figure Channel 810 (1909.80MHz)**



## 4.4. Spurious Emission At Antenna Terminals (+/- 1MHz)

**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.

**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 + 10log(P) dB.

**TEST RESULTS**

| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Spurious Emission At Antenna Terminals (+/- 1MHz) | | |
| Test Mode | Mode 1: GSM 850 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-6 |

**Figure Channel 128 (824.20MHz)**

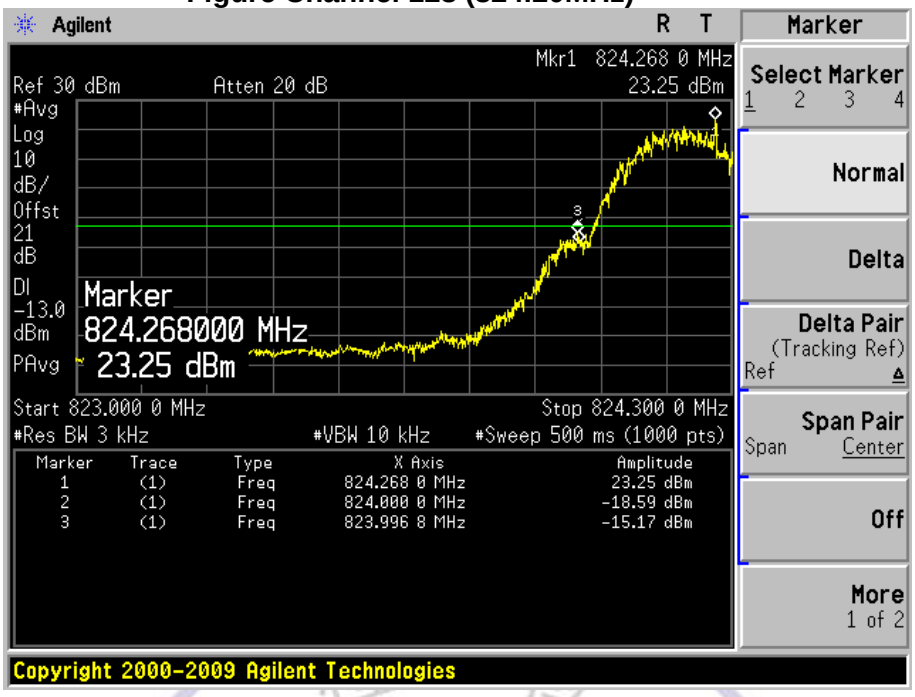
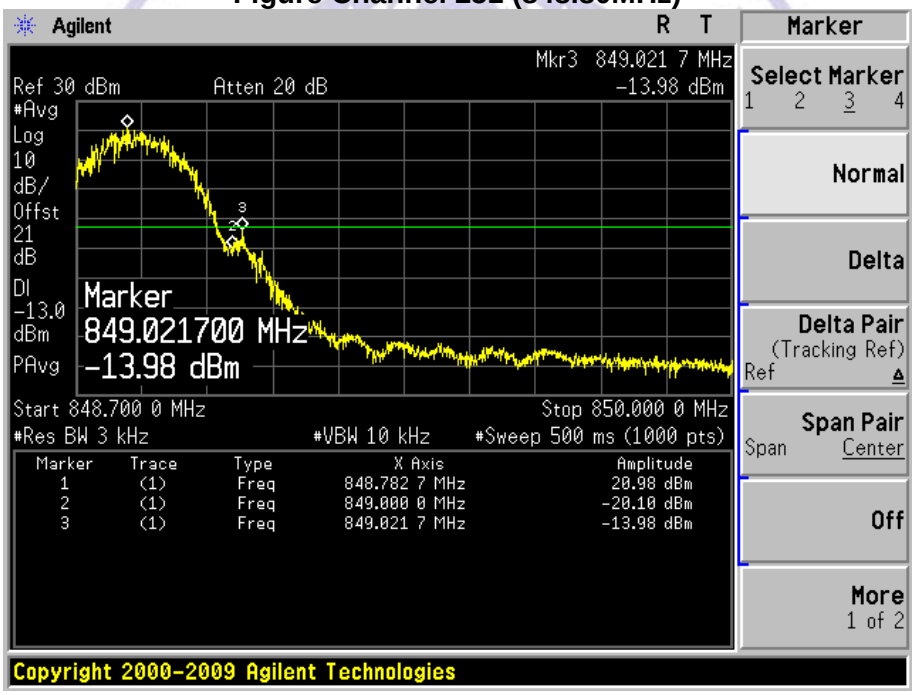



**Figure Channel 251 (848.80MHz)**



| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Spurious Emission At Antenna Terminals (+/- 1MHz) | | |
| Test Mode | Mode 2: PCS1900 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-6 |

**Figure Channel 512 (1850.20MHz)**

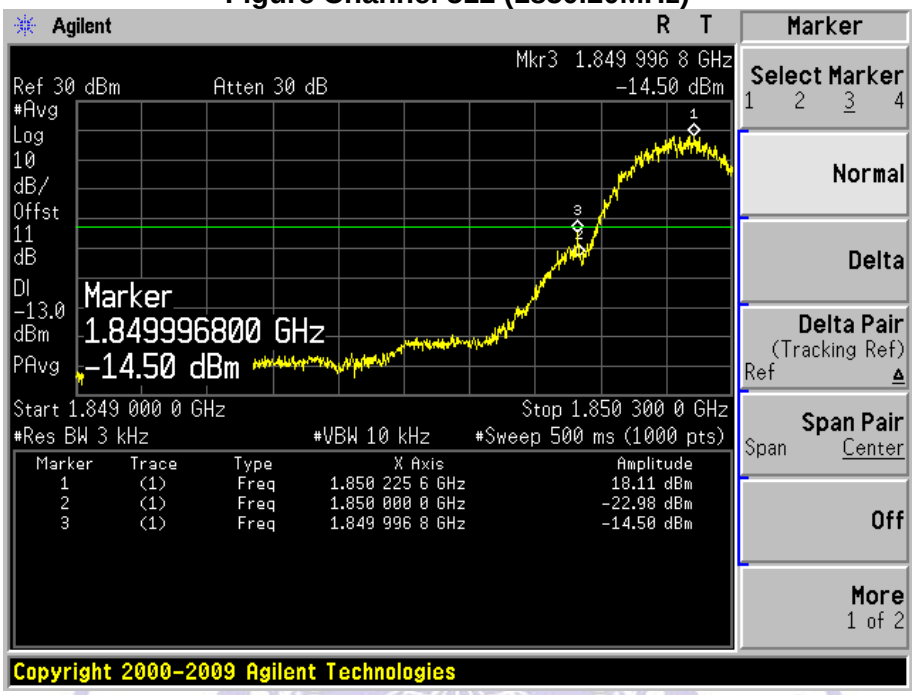
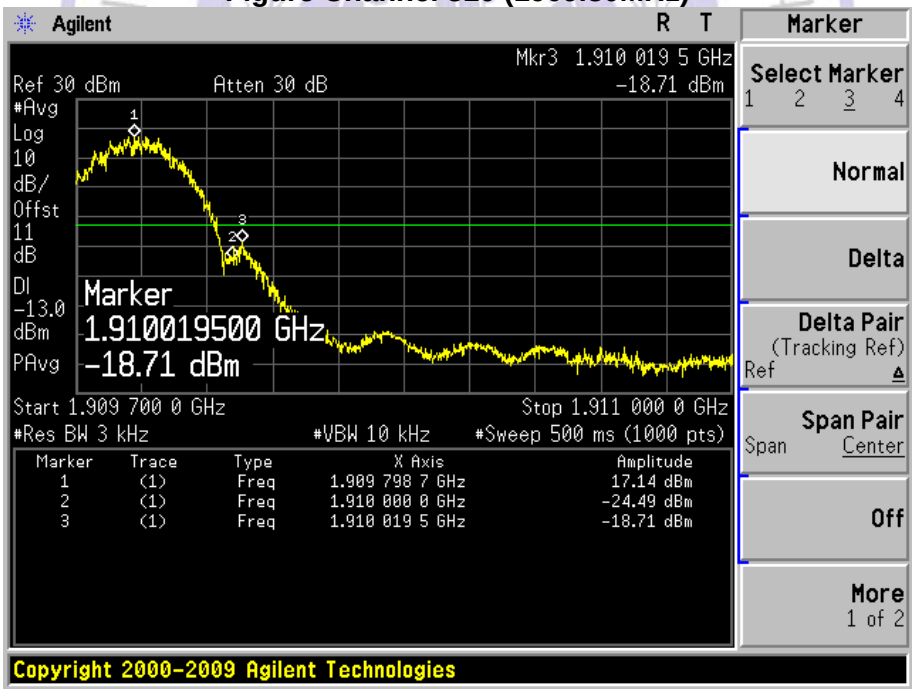



**Figure Channel 810 (1909.80MHz)**



| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Spurious Emission At Antenna Terminals (+/- 1MHz) | | |
| Test Mode | Mode 5: EDGE 850 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC6 |

**Figure Channel 128 (824.20MHz)**

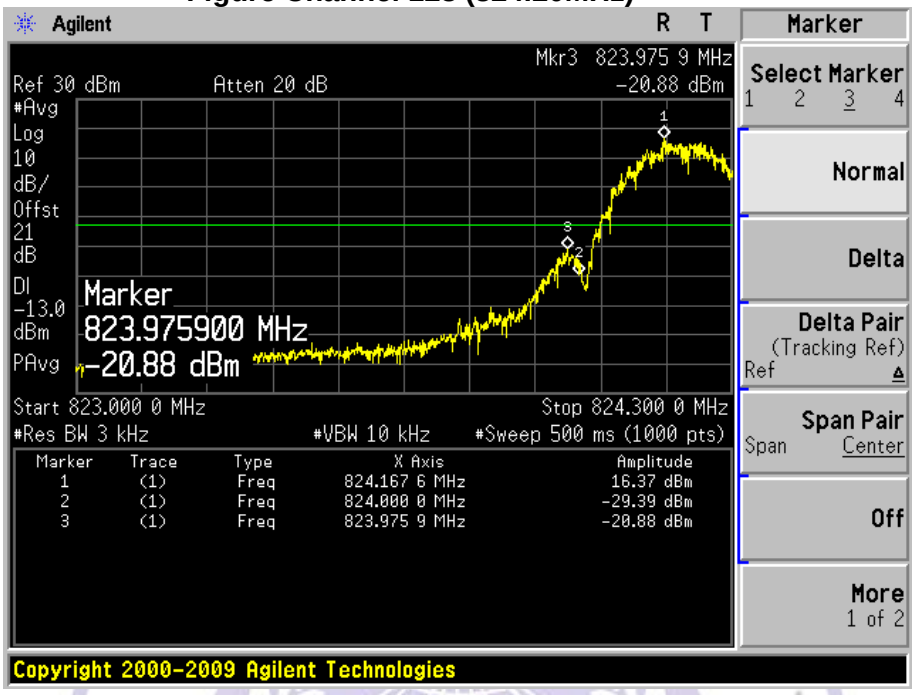
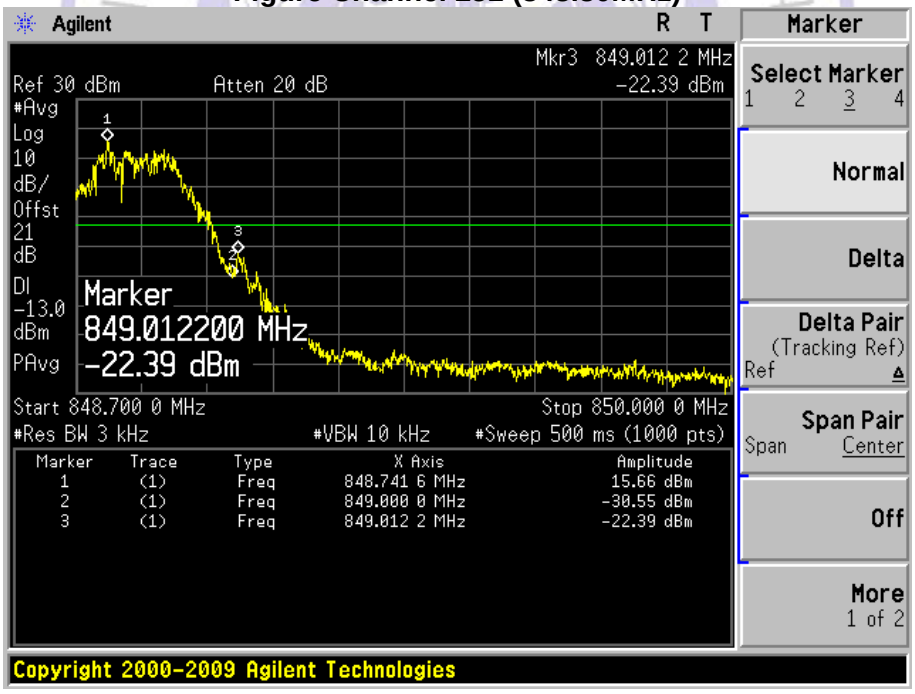



**Figure Channel 251 (848.80MHz)**



| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Spurious Emission At Antenna Terminals (+/- 1MHz) | | |
| Test Mode | Mode 6: EDGE1900 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC6 |

**Figure Channel 512 (1850.20MHz)**

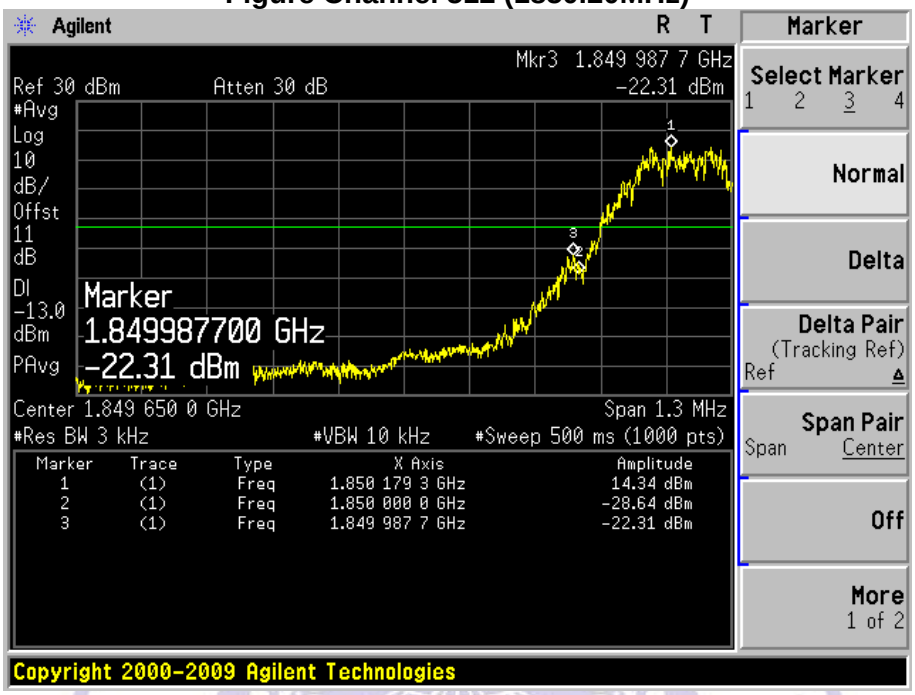
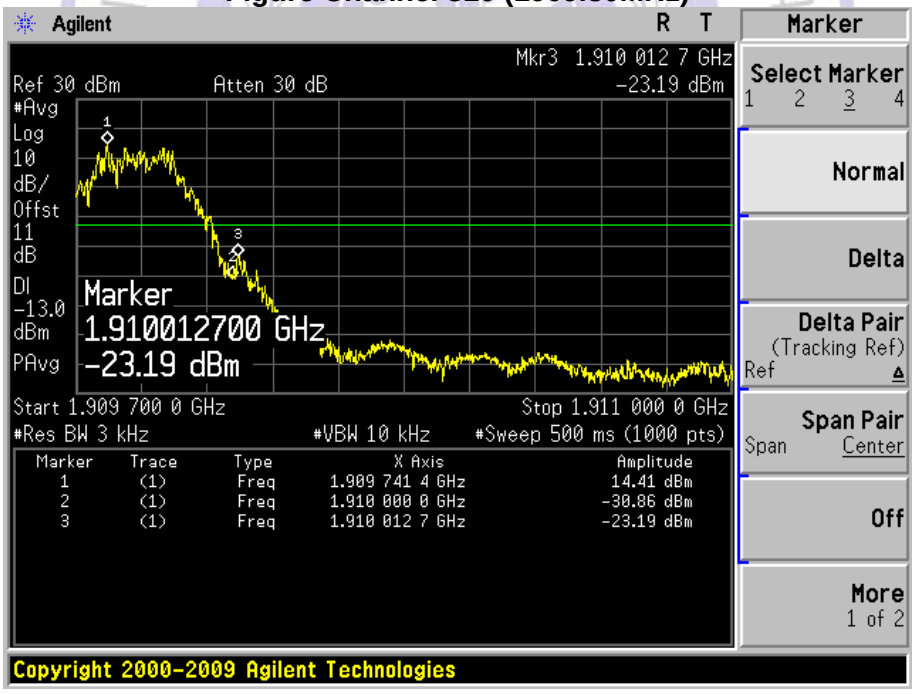


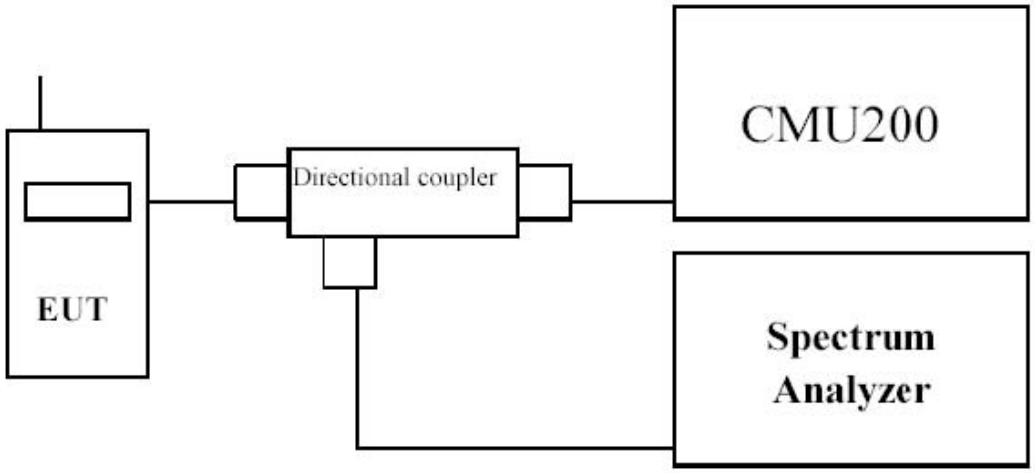

**Figure Channel 810 (1909.80MHz)**



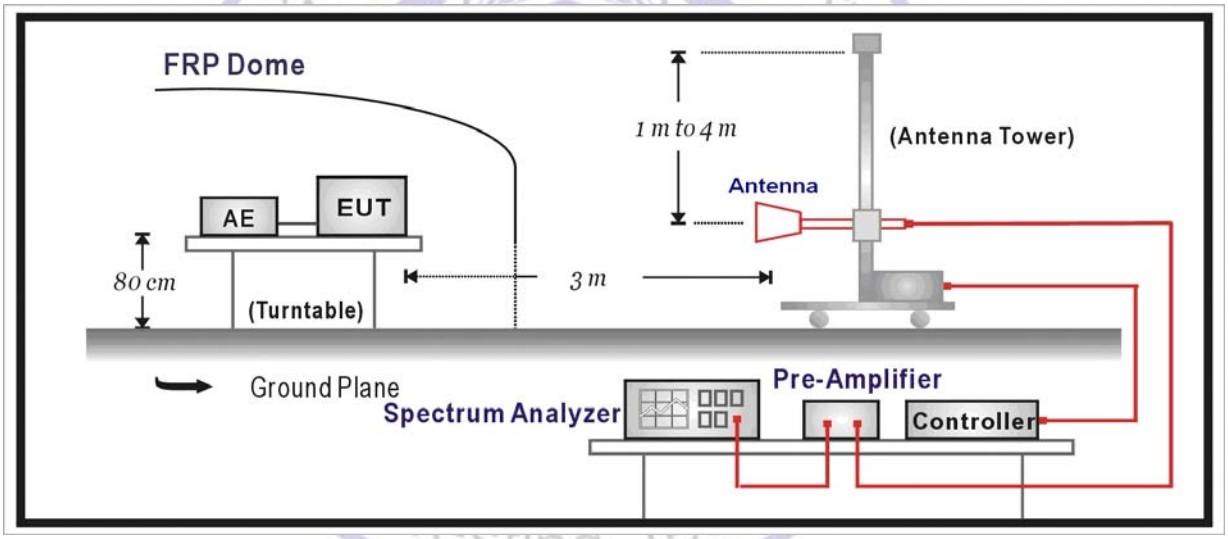
## 4.5. Spurious Emission

**TEST CONFIGURATION**

Conducted Spurious Measurement:




Radiated Spurious Measurement:




**TEST PROCEDURE**

The EUT was setup according to EIA/TIA 603C

**Conducted Spurious Measurement:**

a) Place the EUT on a bench and set it in transmitting mode.

b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.

c) EUT Communicate with CMU200, then select 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 100 kHz for Part 22 and 1MHz for Part 24, sufficient scans were taken to show the out of band Emission if any up to10th 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.

q) The maximum signal level detected by the measuring receiver shall be noted.

h) The transmitter shall be replaced by a substitution antenna.

i) 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.

j) The substitution antenna shall be connected to a calibrated signal generator.

k) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

l) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

m) 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.

n) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

o) 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.

p) 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.

q) Test site anechoic chamber refer to ANSI C63.4: 2009

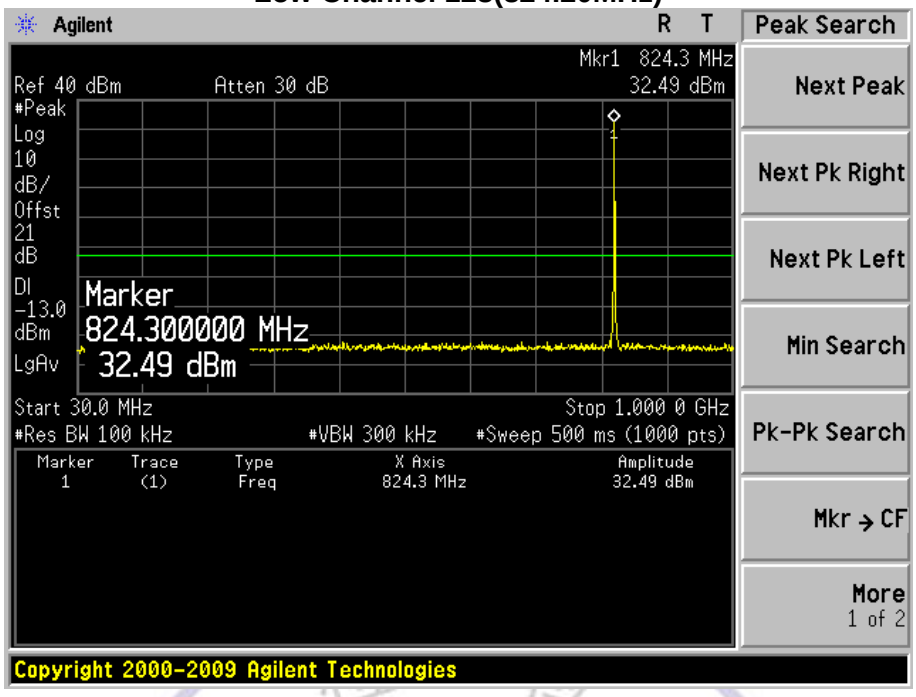
**LIMIT**

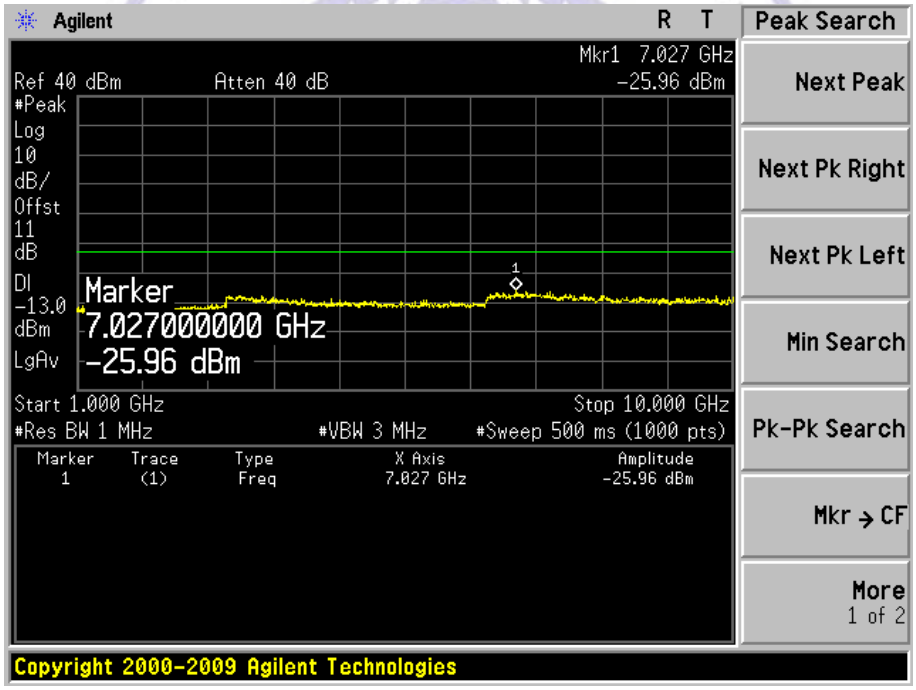
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

**TEST RESULTS**

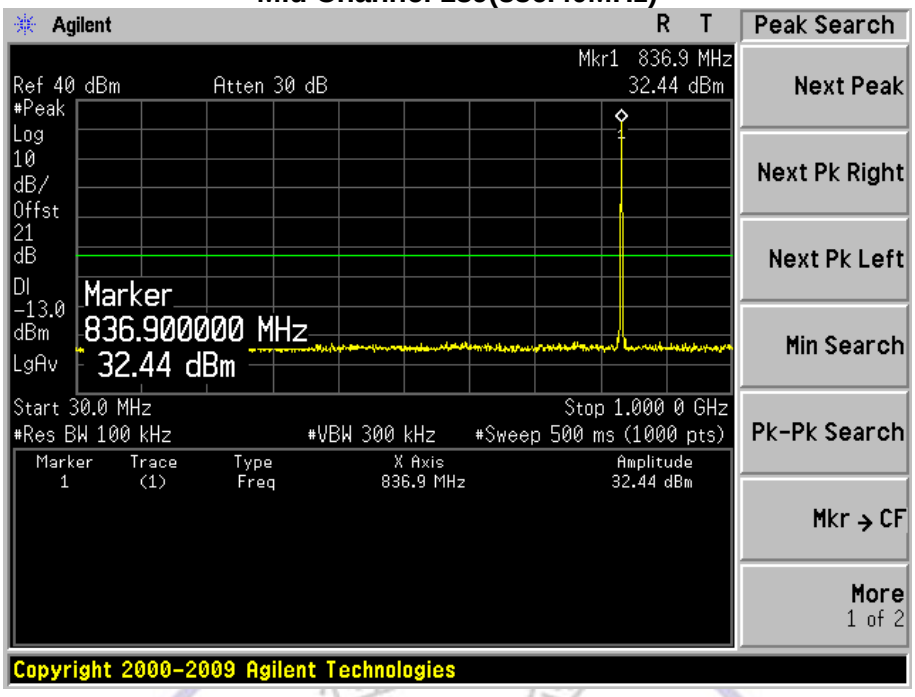
| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Conducted Spurious Emission | | |
| Test Mode | Mode 1: GSM 850 Link | | |
| Date of Test | 2015/01/06 | Test Site | TR-8 |

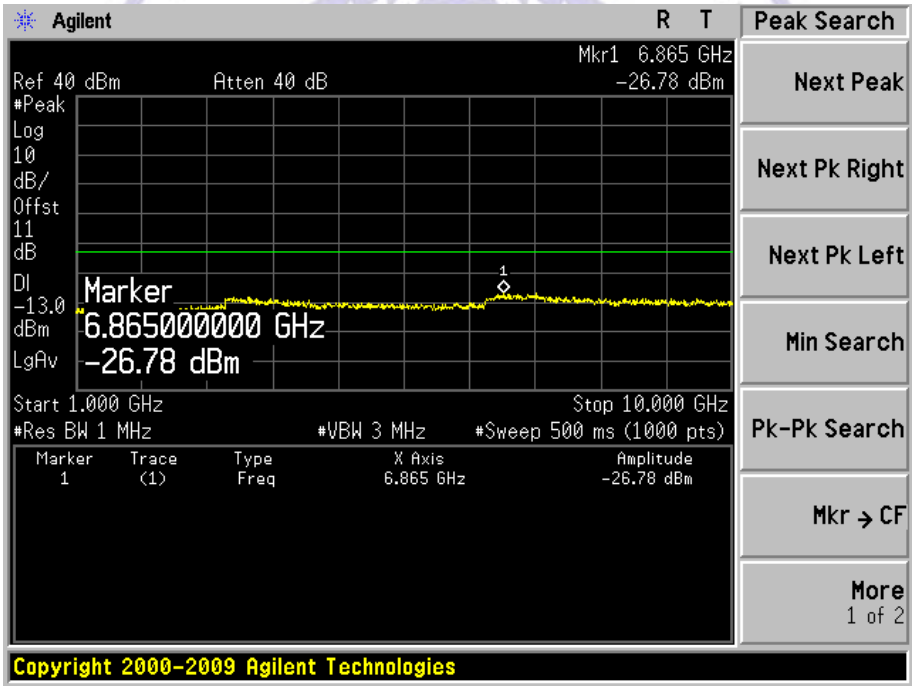
**Low Channel 128(824.20MHz)**



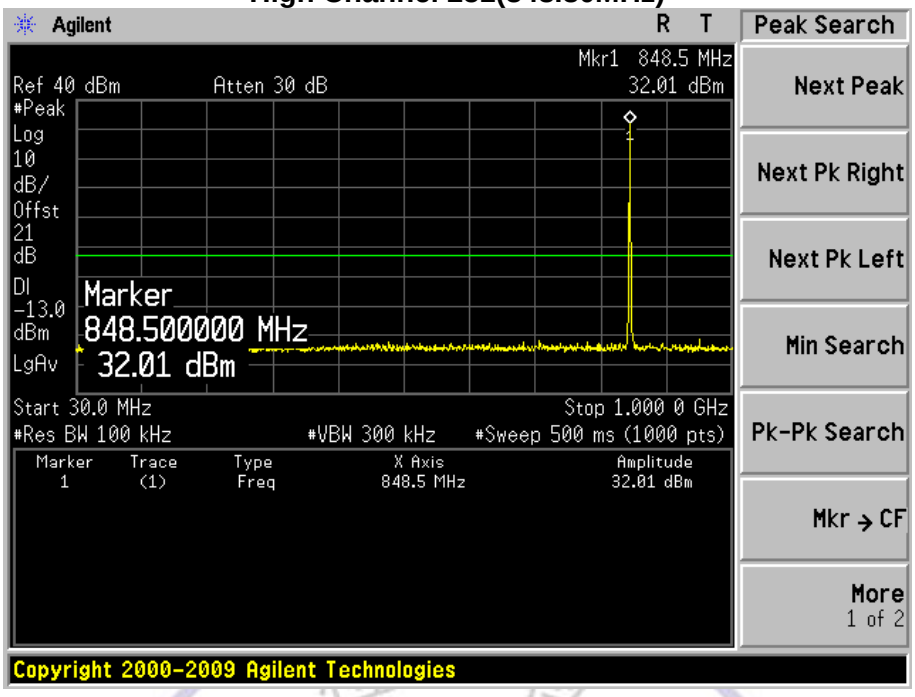



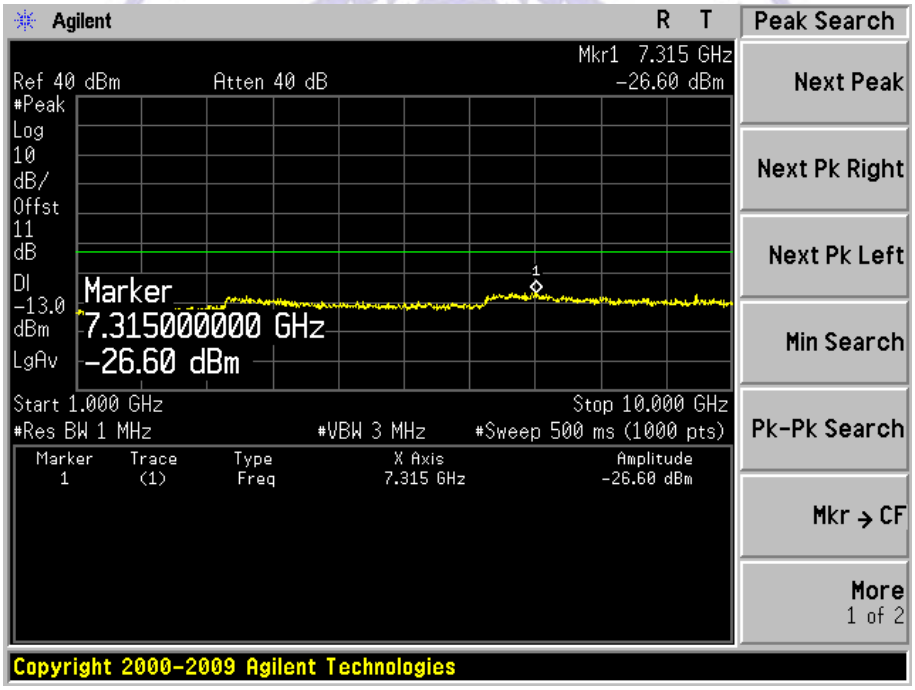
**Mid Channel 189(836.40MHz)**



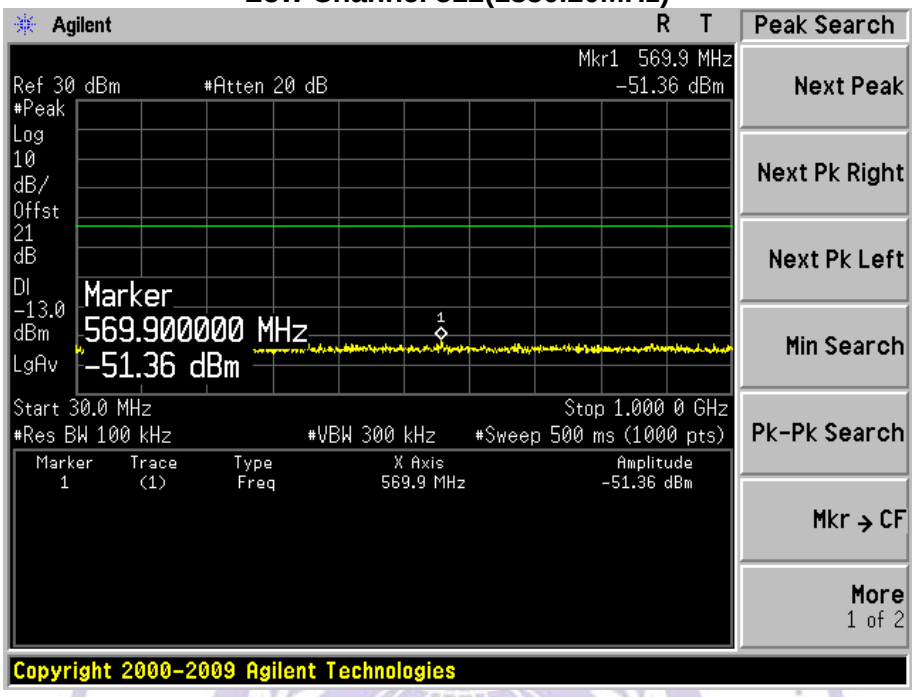
**High Channel 251(848.80MHz)**

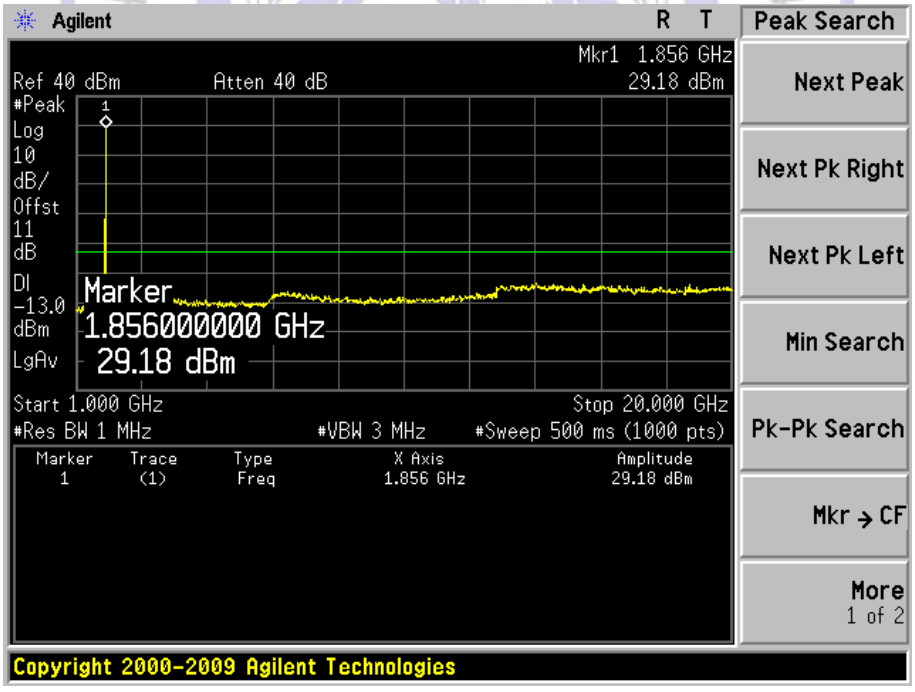


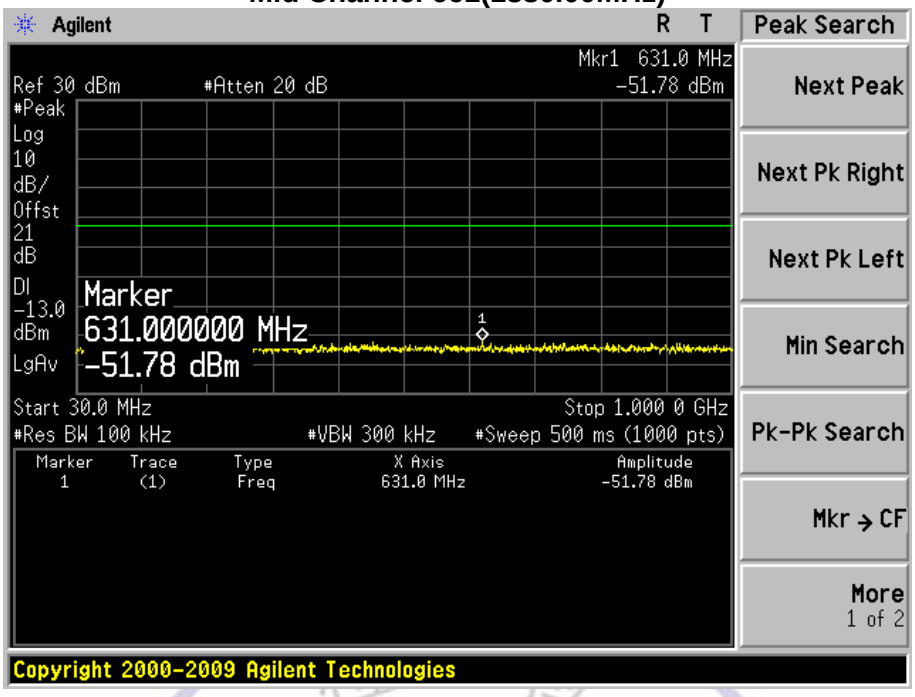
| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Conducted Spurious Emission | | |
| Test Mode | Mode 2: PCS 1900 Link | | |
| Date of Test | 2015/01/06 | Test Site | TR-8 |

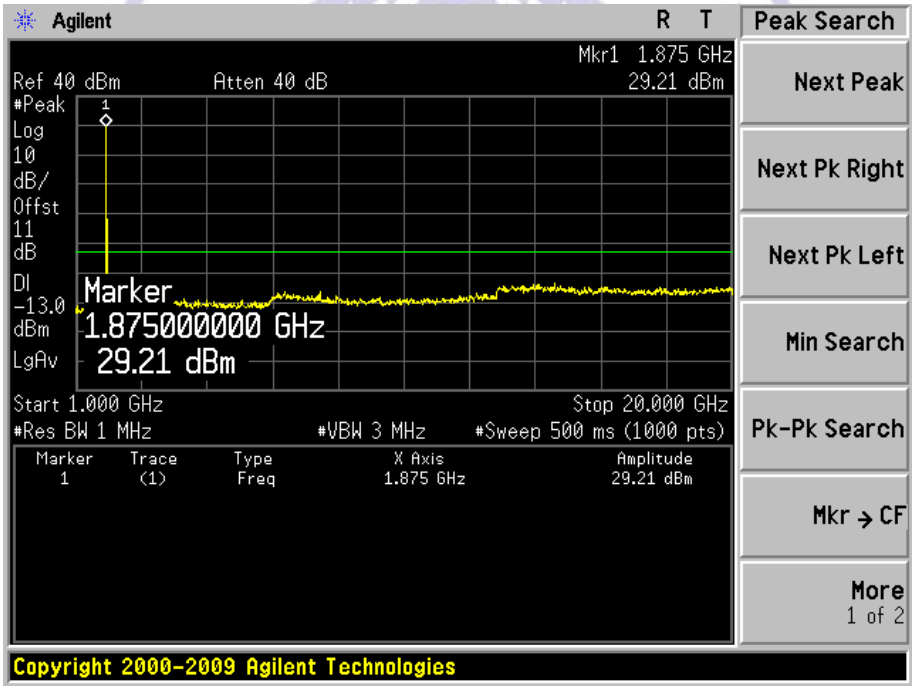
**Low Channel 512(1850.20MHz)**



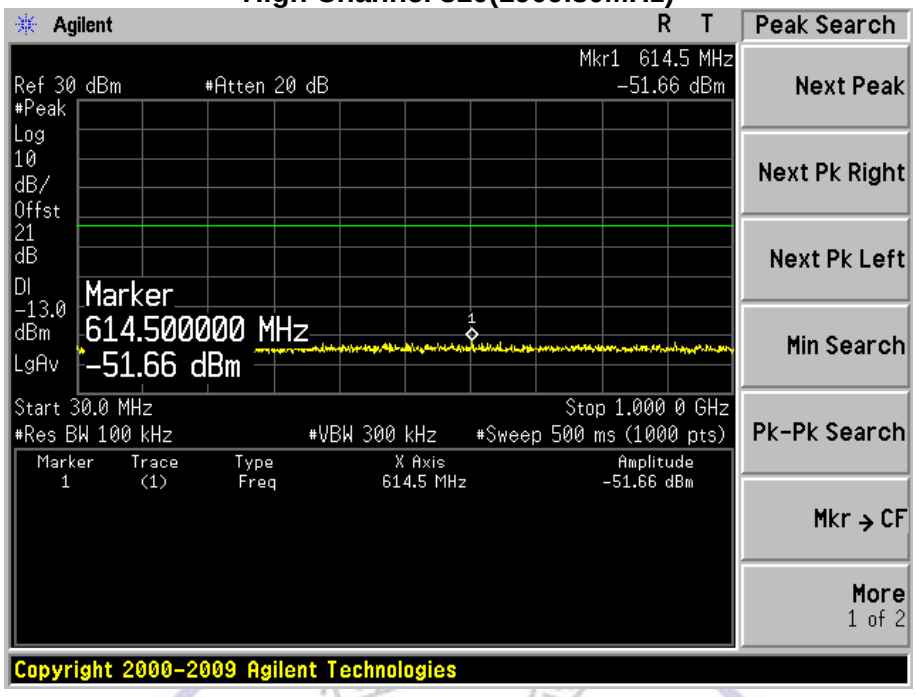



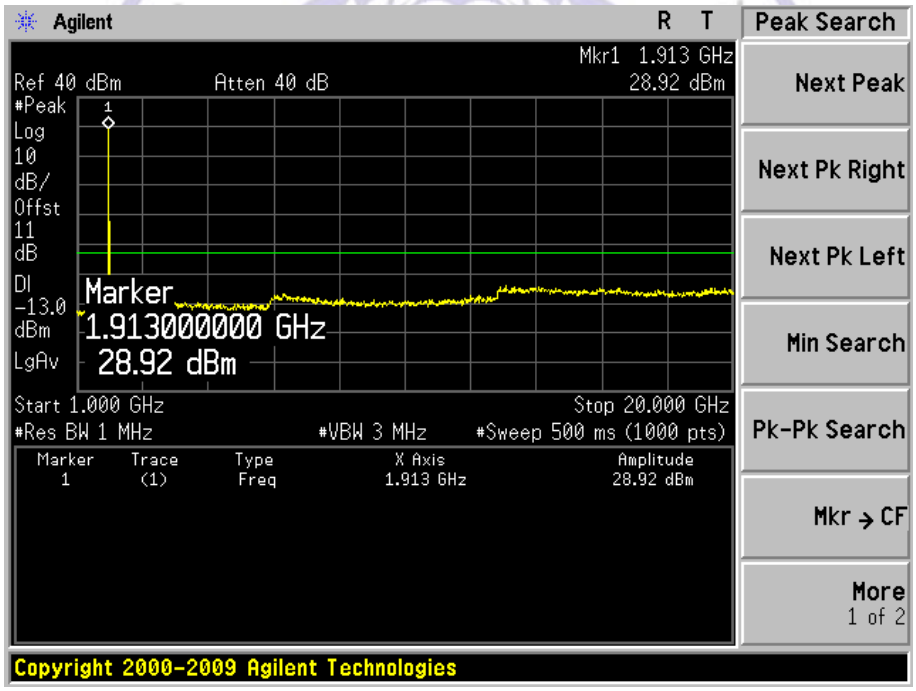
**Mid Channel 661(1880.00MHz)**



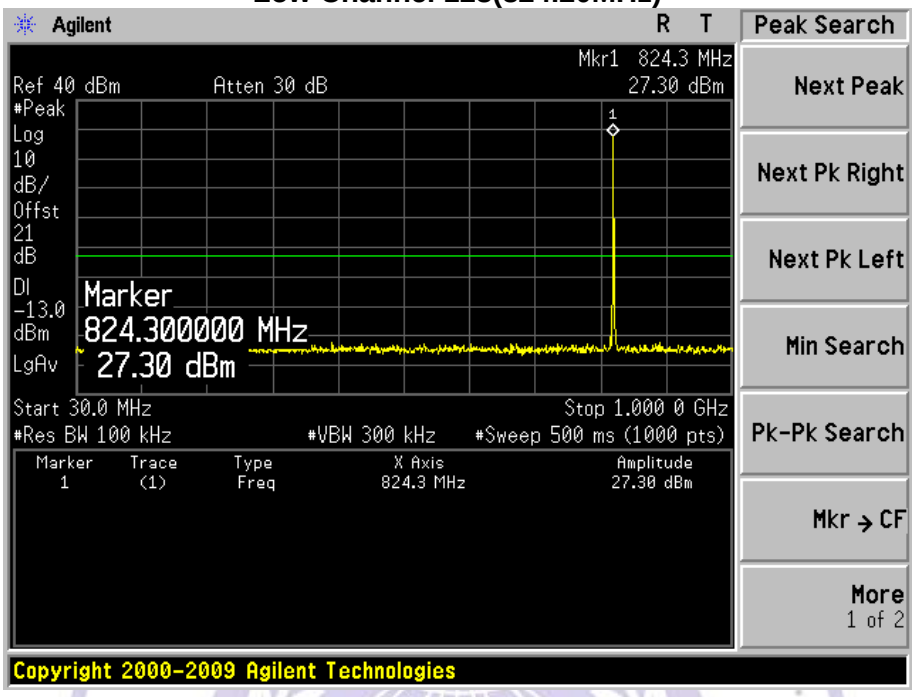
**High Channel 810(1909.80MHz)**

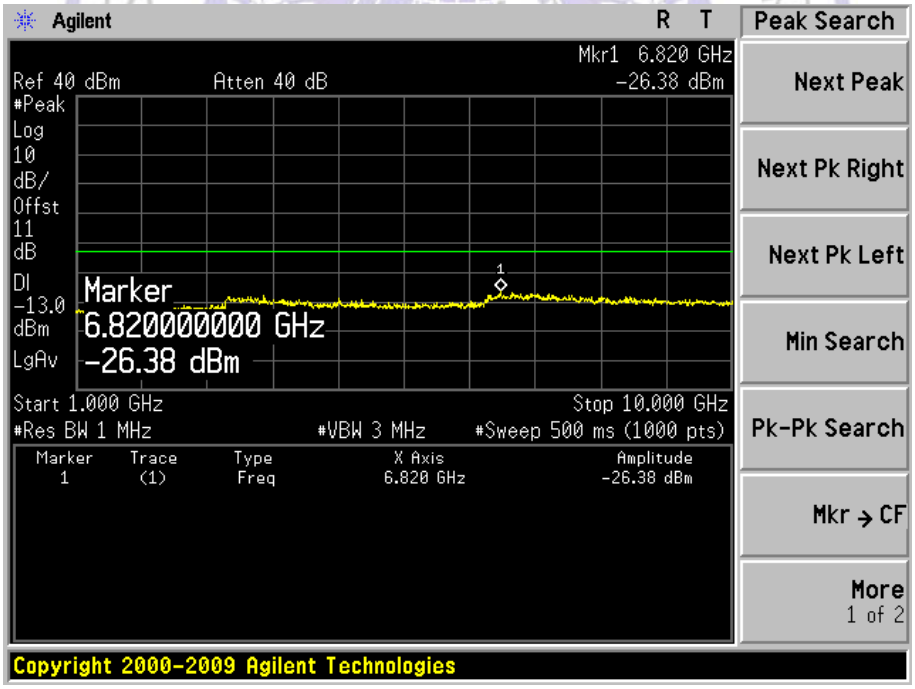


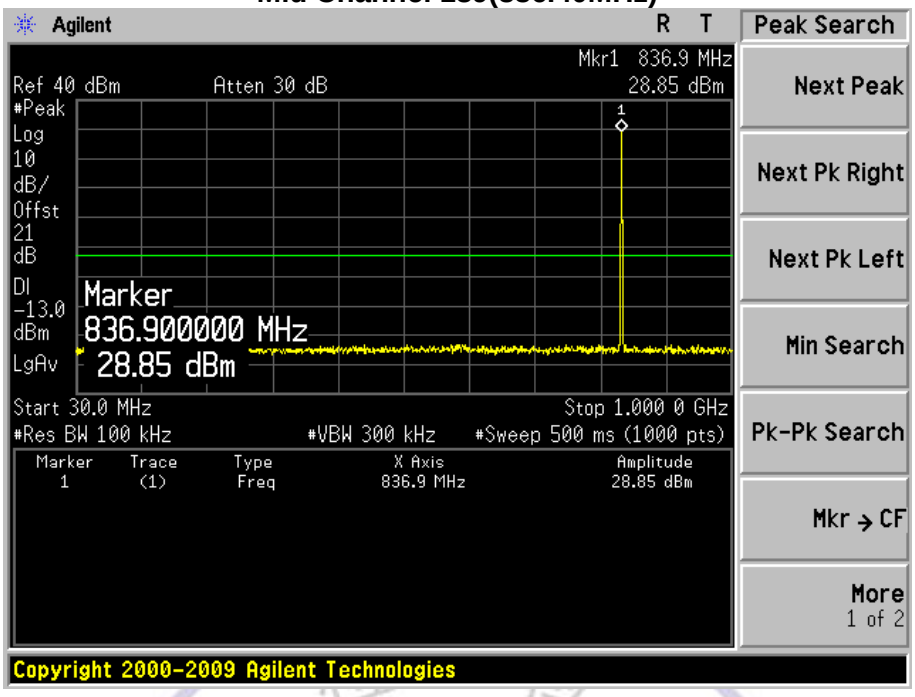
| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Conducted Spurious Emission | | |
| Test Mode | Mode 5: EDGE 850 Link | | |
| Date of Test | 2015/01/09 | Test Site | TR8 |

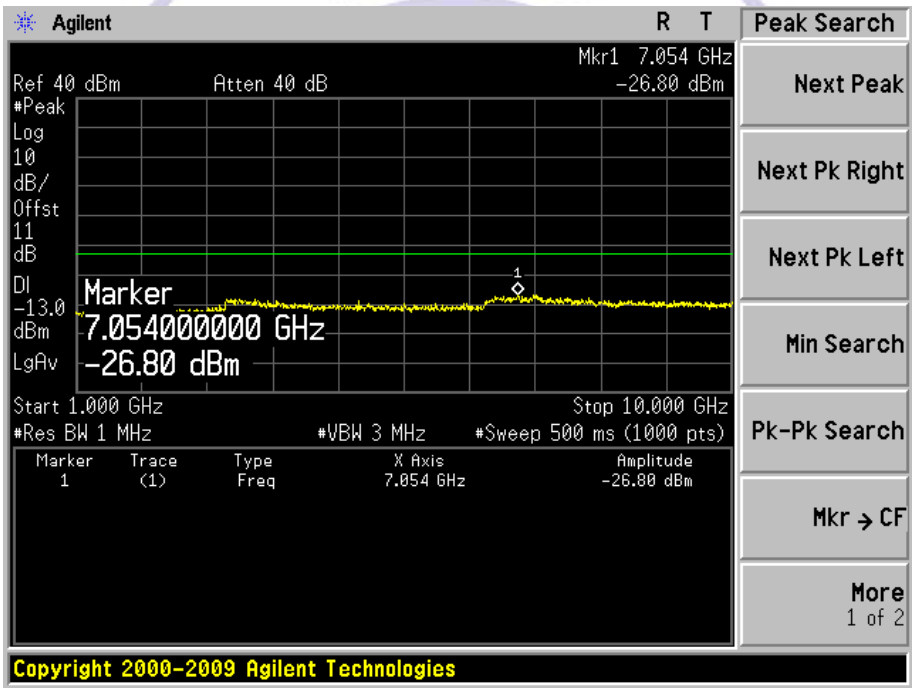
**Low Channel 128(824.20MHz)**



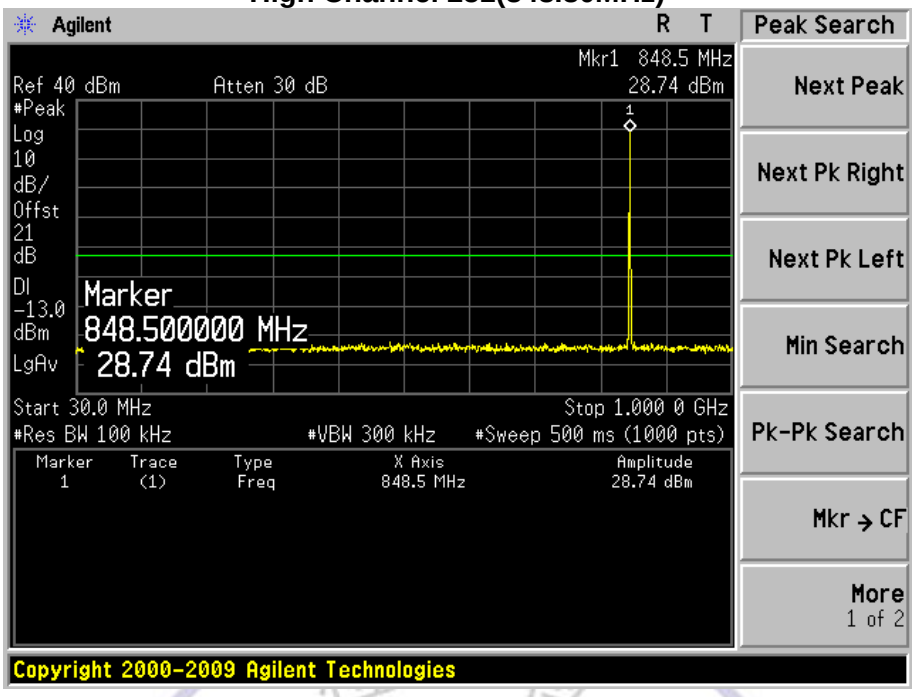



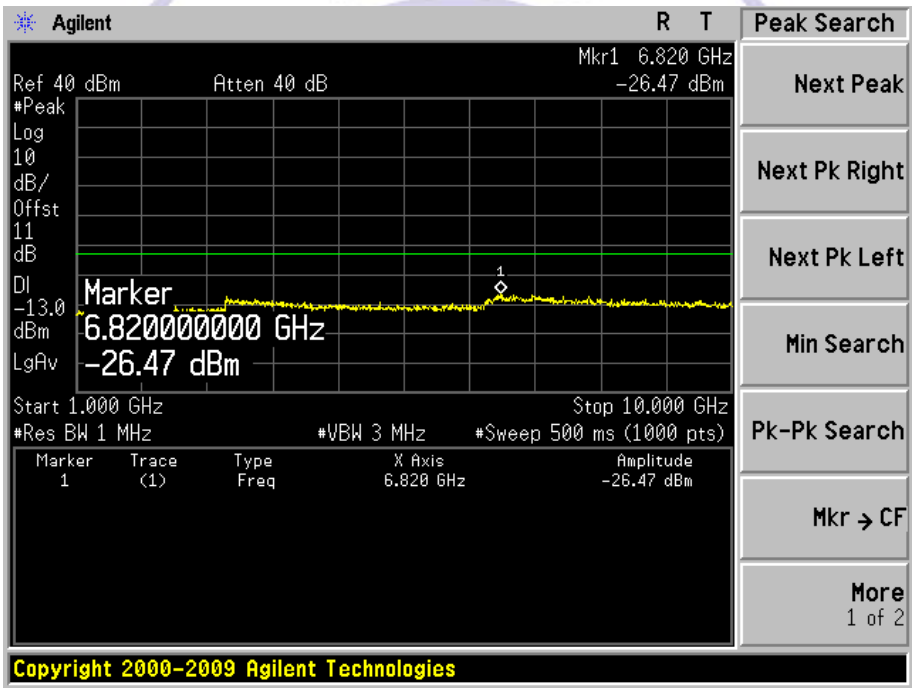
**Mid Channel 189(836.40MHz)**



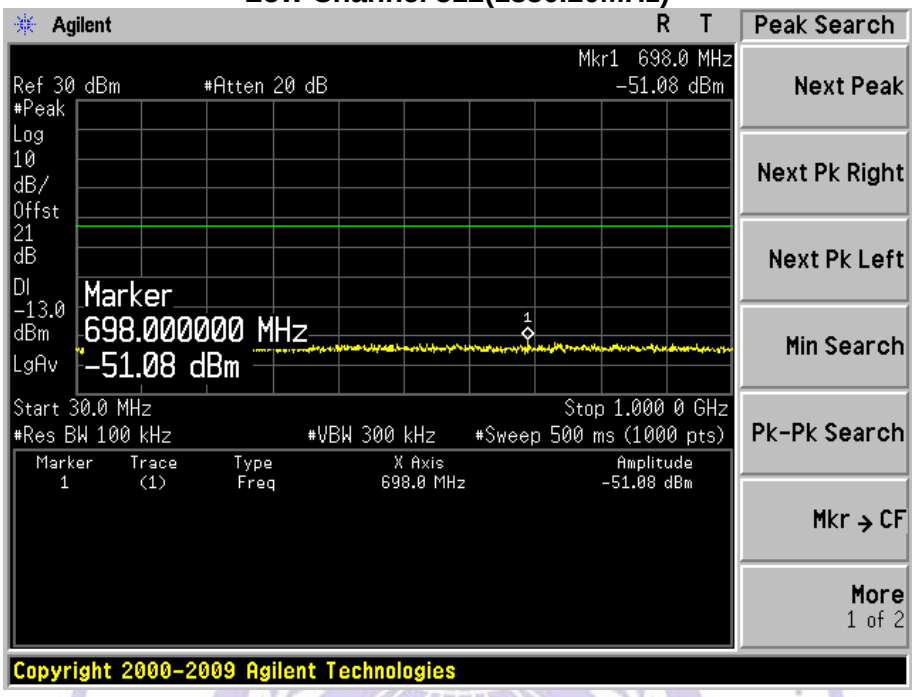
**High Channel 251(848.80MHz)**

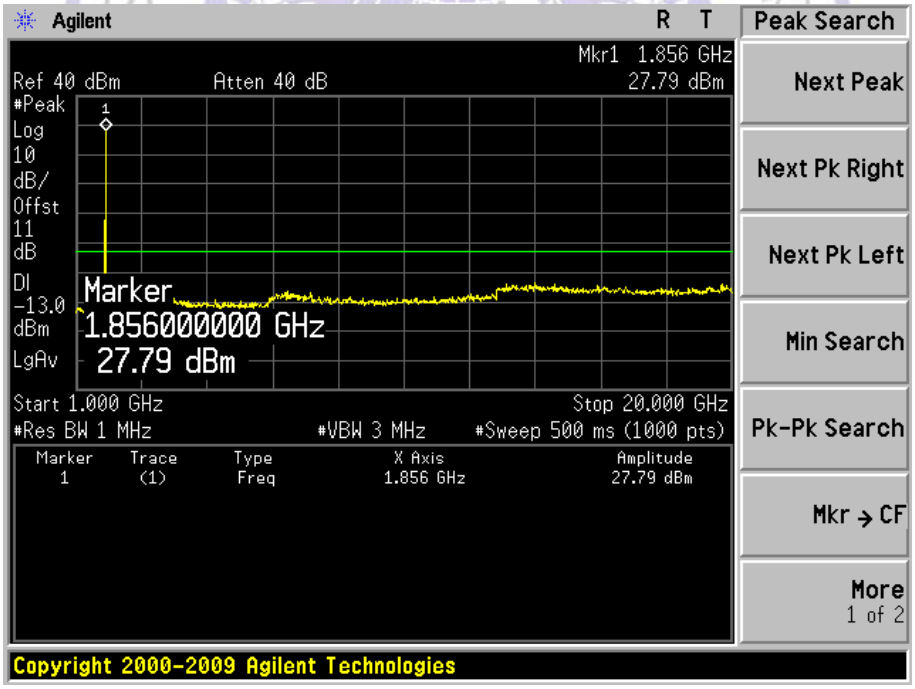


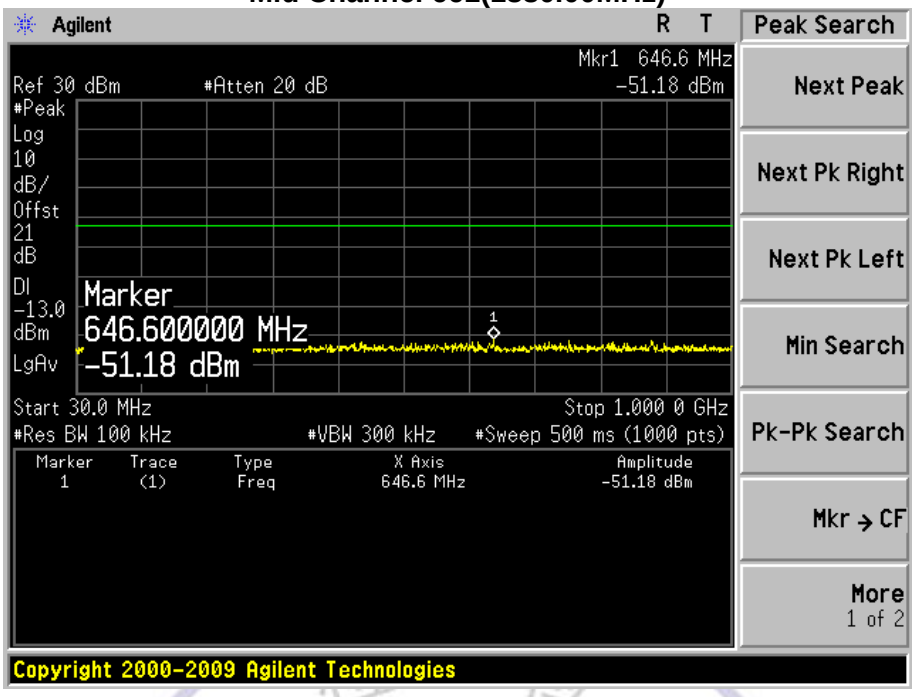
| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Conducted Spurious Emission | | |
| Test Mode | Mode 6: EDGE1900 Link | | |
| Date of Test | 2015/01/09 | Test Site | TR8 |

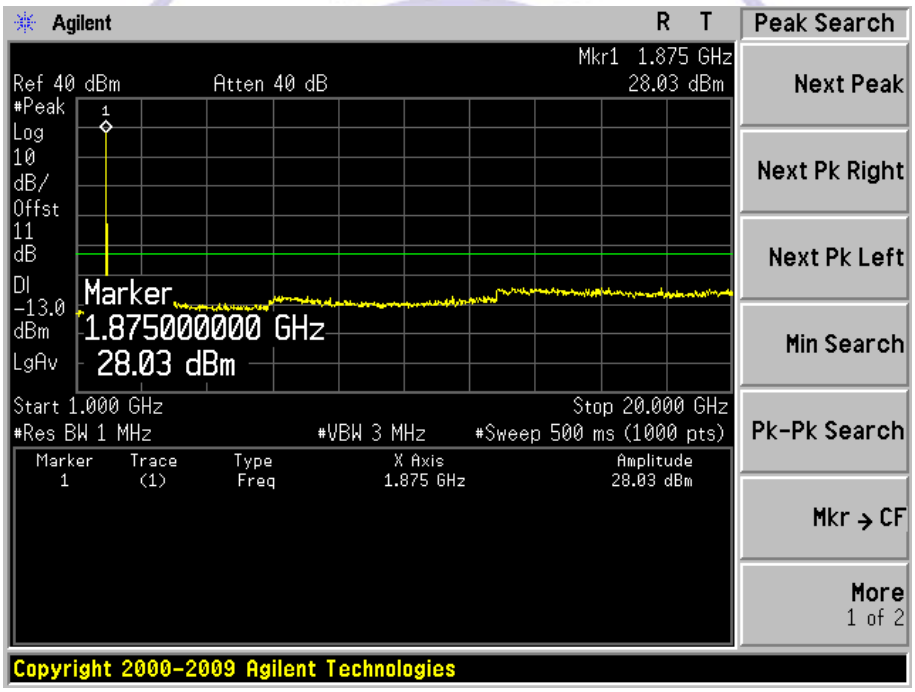
**Low Channel 512(1850.20MHz)**



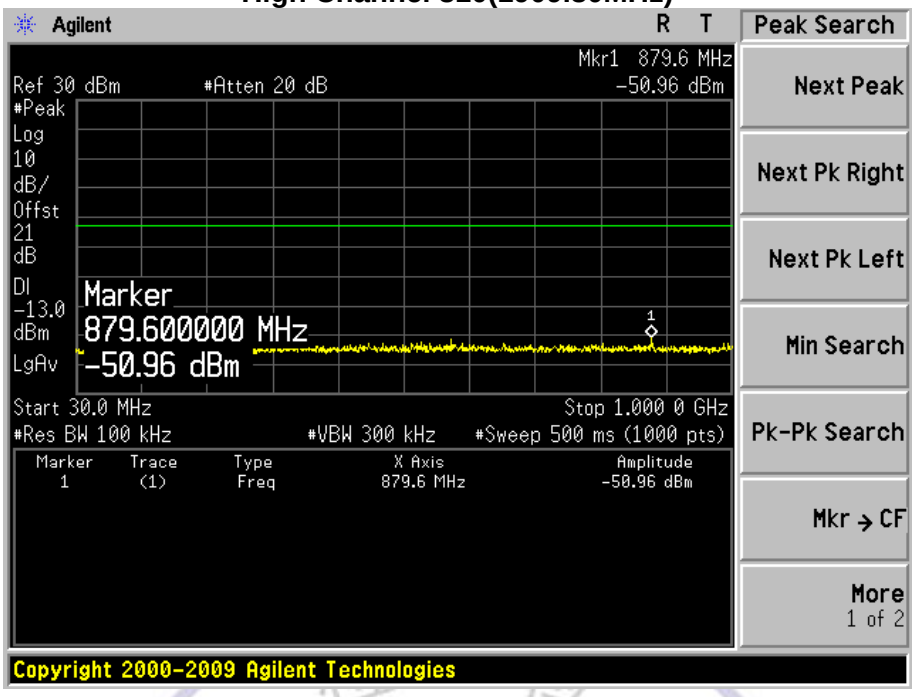



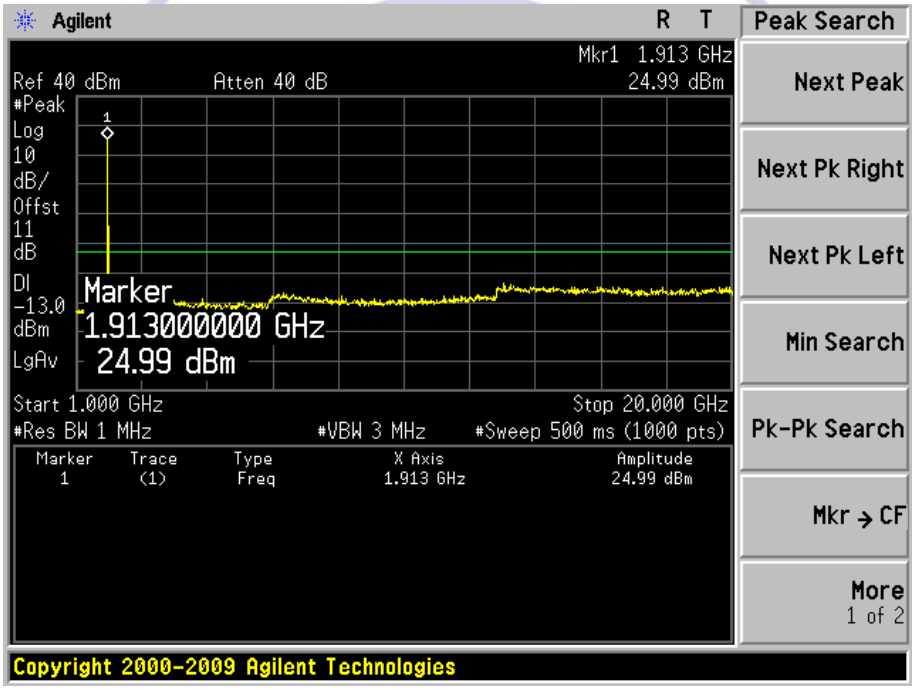
**Mid Channel 661(1880.00MHz)**



**High Channel 810(1909.80MHz)**



| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Radiated Spurious Emission | | |
| Test Mode | Mode 1: GSM 850 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-5 |

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 128 (824.20MHz) | | | | | | | | |
| 1646.00 | -52.62 | V | -55.19 | 2.50 | 9.75 | -47.94 | -13.00 | -34.94 |
| 2470.50 | -62.15 | V | -61.20 | 3.12 | 10.48 | -53.84 | -13.00 | -40.84 |
| 1646.00 | -47.19 | H | -49.85 | 2.50 | 9.75 | -42.60 | -13.00 | -29.60 |
| 2470.50 | -59.46 | H | -58.36 | 3.12 | 10.48 | -51.00 | -13.00 | -38.00 |
| Middle Channel 189 (836.40MHz) | | | | | | | | |
| 1671.50 | -57.26 | V | -59.92 | 2.52 | 9.95 | -52.49 | -13.00 | -39.49 |
| 2513.00 | -63.62 | V | -63.00 | 3.18 | 10.62 | -55.56 | -13.00 | -42.56 |
| 1671.50 | -50.08 | H | -52.49 | 2.52 | 9.95 | -45.06 | -13.00 | -32.06 |
| 2513.00 | -60.54 | H | -59.60 | 3.18 | 10.62 | -52.16 | -13.00 | -39.16 |
| High Channel 251 (848.80MHz) | | | | | | | | |
| 1697.00 | -53.47 | V | -56.20 | 2.54 | 10.06 | -48.68 | -13.00 | -35.68 |
| 2547.00 | -63.25 | V | -61.70 | 3.14 | 10.68 | -54.16 | -13.00 | -41.16 |
| 1697.00 | -47.58 | H | -49.58 | 2.54 | 10.06 | -42.06 | -13.00 | -29.06 |
| 2547.00 | -59.43 | H | -57.62 | 3.14 | 10.68 | -50.08 | -13.00 | -37.08 |

| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Radiated Spurious Emission | | |
| Test Mode | Mode 2: PCS 1900 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC-5 |

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 512 (1850.20MHz) | | | | | | | | |
| 3700.00 | -46.54 | V | -43.09 | 3.84 | 12.69 | -34.24 | -13.00 | -21.24 |
| 5550.00 | -58.04 | V | -45.07 | 4.82 | 13.15 | -36.74 | -13.00 | -23.74 |
| 3700.00 | -41.04 | H | -37.66 | 3.84 | 12.69 | -28.81 | -13.00 | -15.81 |
| 5550.00 | -58.06 | H | -45.36 | 4.82 | 13.15 | -37.03 | -13.00 | -24.03 |
| Middle Channel 661 (1880.00MHz) | | | | | | | | |
| 3760.00 | -48.20 | V | -44.98 | 3.73 | 12.72 | -35.99 | -13.00 | -22.99 |
| 5640.00 | -55.27 | V | -42.19 | 4.93 | 13.14 | -33.98 | -13.00 | -20.98 |
| 3760.00 | -39.48 | H | -36.16 | 3.73 | 12.72 | -27.17 | -13.00 | -14.17 |
| 5640.00 | -58.64 | H | -45.57 | 4.93 | 13.14 | -37.36 | -13.00 | -24.36 |
| High Channel 810 (1909.80MHz) | | | | | | | | |
| 3818.00 | -43.41 | V | -39.70 | 4.02 | 12.73 | -30.99 | -13.00 | -17.99 |
| 5727.00 | -57.14 | V | -44.35 | 4.87 | 13.11 | -36.11 | -13.00 | -23.11 |
| 3818.00 | -37.32 | H | -33.46 | 4.02 | 12.73 | -24.75 | -13.00 | -11.75 |
| 5727.00 | -62.28 | H | -49.86 | 4.87 | 13.11 | -41.62 | -13.00 | -28.62 |

| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Radiated Spurious Emission | | |
| Test Mode | Mode 5: EDGE S850 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC5 |

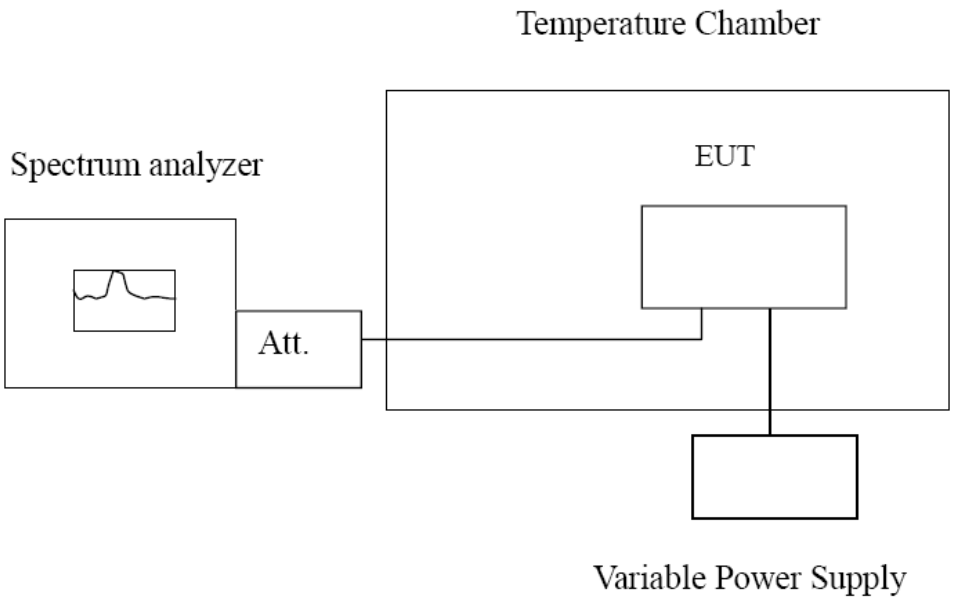
| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 128 (824.20MHz) | | | | | | | | |
| 1646.00 | -53.72 | V | -56.28 | 2.50 | 9.75 | -49.03 | -13.00 | -36.03 |
| 2470.50 | -60.94 | V | -56.00 | 3.12 | 10.48 | -48.64 | -13.00 | -35.64 |
| 1646.00 | -48.90 | H | -51.56 | 2.50 | 9.75 | -44.31 | -13.00 | -31.31 |
| 2470.50 | -60.12 | H | -56.71 | 3.12 | 10.48 | -49.35 | -13.00 | -36.35 |
| Middle Channel 189 (836.40MHz) | | | | | | | | |
| 1671.50 | -55.40 | V | -58.07 | 2.52 | 9.95 | -50.64 | -13.00 | -37.64 |
| 2513.00 | -58.21 | V | -52.89 | 3.18 | 10.62 | -45.45 | -13.00 | -32.45 |
| 1671.50 | -50.36 | H | -52.77 | 2.52 | 9.95 | -45.34 | -13.00 | -32.34 |
| 2513.00 | -59.67 | H | -58.73 | 3.18 | 10.62 | -51.29 | -13.00 | -38.29 |
| High Channel 251 (848.80MHz) | | | | | | | | |
| 1697.00 | -56.67 | V | -59.41 | 2.54 | 10.06 | -51.89 | -13.00 | -38.89 |
| 2547.00 | -59.06 | V | -54.07 | 3.14 | 10.68 | -46.53 | -13.00 | -33.53 |
| 1697.00 | -47.75 | H | -49.75 | 2.54 | 10.06 | -42.23 | -13.00 | -29.23 |
| 2547.00 | -60.13 | H | -58.32 | 3.14 | 10.68 | -50.78 | -13.00 | -37.78 |

| | | | |
|---|---|---|---|
| Product | Smart Watch | | |
| Test Item | Radiated Spurious Emission | | |
| Test Mode | Mode 6: EDGE 1900 Link | | |
| Date of Test | 2015/01/09 | Test Site | AC5 |

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| Low Channel 512 (1850.20MHz) | | | | | | | | |
| 3700.00 | -50.36 | V | -46.90 | 3.84 | 12.69 | -38.05 | -13.00 | -25.05 |
| 5550.00 | -61.51 | V | -48.54 | 4.82 | 13.15 | -40.21 | -13.00 | -27.21 |
| 3700.00 | -44.11 | H | -40.74 | 3.84 | 12.69 | -31.89 | -13.00 | -18.89 |
| 5550.00 | -64.28 | H | -55.93 | 4.82 | 13.15 | -47.60 | -13.00 | -34.60 |
| Middle Channel 661 (1880.00MHz) | | | | | | | | |
| 3760.00 | -49.14 | V | -45.91 | 3.73 | 12.72 | -36.92 | -13.00 | -23.92 |
| 5640.00 | -60.33 | V | -47.25 | 4.93 | 13.14 | -39.04 | -13.00 | -26.04 |
| 3760.00 | -43.37 | H | -40.06 | 3.73 | 12.72 | -31.07 | -13.00 | -18.07 |
| 5640.00 | -61.70 | H | -48.64 | 4.93 | 13.14 | -40.43 | -13.00 | -27.43 |
| High Channel 810 (1909.80MHz) | | | | | | | | |
| 3818.00 | -47.67 | V | -43.95 | 4.02 | 12.73 | -35.24 | -13.00 | -22.24 |
| 5727.00 | -63.58 | V | -55.42 | 4.87 | 13.11 | -47.18 | -13.00 | -34.18 |
| 3818.00 | -39.62 | H | -35.76 | 4.02 | 12.73 | -27.05 | -13.00 | -14.05 |
| 5727.00 | -64.49 | H | -54.21 | 4.87 | 13.11 | -45.97 | -13.00 | -32.97 |

## 4.6. Frequency Stability under Temperature & Voltage Variations

**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℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

**Frequency Stability Under Voltage Variations:**
Set chamber temperature to 20℃. 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 (±15%) and endpoint, record the maximum frequency change.

**LIMIT**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
Limit < ± 2.5 ppm

**TEST RESULTS**

| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Frequency Stability Under Temperature & Voltage Variations | | |
| Test Mode | Mode 1: GSM 850 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC6 |

Frequency Stability under Temperature

| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| -30 | 836.40 | 66 | ± 2091 |
| -20 | 836.40 | -33 | ± 2091 |
| -10 | 836.40 | -23 | ± 2091 |
| 0 | 836.40 | -44 | ± 2091 |
| 10 | 836.40 | 69 | ± 2091 |
| 20 | 836.40 | -22 | ± 2091 |
| 30 | 836.40 | 36 | ± 2091 |
| 40 | 836.40 | -69 | ± 2091 |
| 50 | 836.40 | 45 | ± 2091 |

Frequency Stability under Voltage

| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| 4.200 | 836.40 | -11 | ± 2091 |
| 3.700 | 836.40 | 22 | ± 2091 |
| 3.600 | 836.40 | -36 | ± 2091 |

| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Frequency Stability Under Temperature & Voltage Variations | | |
| Test Mode | Mode 2: PCS1900 Link | | |
| Date of Test | 2015/01/06 | Test Site | AC6 |

Frequency Stability under Temperature

| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| -30 | 1880.00 | -44 | ± 4700 |
| -20 | 1880.00 | 26 | ± 4700 |
| -10 | 1880.00 | -39 | ± 4700 |
| 0 | 1880.00 | -56 | ± 4700 |
| 10 | 1880.00 | 44 | ± 4700 |
| 20 | 1880.00 | 35 | ± 4700 |
| 30 | 1880.00 | 43 | ± 4700 |
| 40 | 1880.00 | -59 | ± 4700 |
| 50 | 1880.00 | -74 | ± 4700 |

Frequency Stability under Voltage

| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| 4.200 | 1880.00 | -28 | ± 4700 |
| 3.700 | 1880.00 | -67 | ± 4700 |
| 3.600 | 1880.00 | 32 | ± 4700 |

| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Frequency Stability Under Temperature & Voltage Variations | | |
| Test Mode | Mode 5: EDGE 850 Link | | |
| Date of Test | 2015/01/09 | Test Site | TR7 |

Frequency Stability under Temperature

| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| -30 | 836.40 | 12 | ± 2091 |
| -20 | 836.40 | -24 | ± 2091 |
| -10 | 836.40 | 79 | ± 2091 |
| 0 | 836.40 | 21 | ± 2091 |
| 10 | 836.40 | -15 | ± 2091 |
| 20 | 836.40 | -19 | ± 2091 |
| 30 | 836.40 | -44 | ± 2091 |
| 40 | 836.40 | -47 | ± 2091 |
| 50 | 836.40 | -58 | ± 2091 |

Frequency Stability under Voltage

| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| 4.200 | 836.40 | 25 | ± 2091 |
| 3.700 | 836.40 | 43 | ± 2091 |
| 3.600 | 836.40 | 74 | ± 2091 |

| Product | Smart Watch | | |
|---|---|---|---|
| Test Item | Frequency Stability Under Temperature & Voltage Variations | | |
| Test Mode | Mode 6: EDGE1900 Link | | |
| Date of Test | 2015/01/09 | Test Site | TR7 |

Frequency Stability under Temperature

| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| -30 | 1880.00 | -56 | ± 4700 |
| -20 | 1880.00 | 73 | ± 4700 |
| -10 | 1880.00 | -26 | ± 4700 |
| 0 | 1880.00 | -14 | ± 4700 |
| 10 | 1880.00 | 37 | ± 4700 |
| 20 | 1880.00 | -57 | ± 4700 |
| 30 | 1880.00 | 43 | ± 4700 |
| 40 | 1880.00 | 18 | ± 4700 |
| 50 | 1880.00 | 29 | ± 4700 |

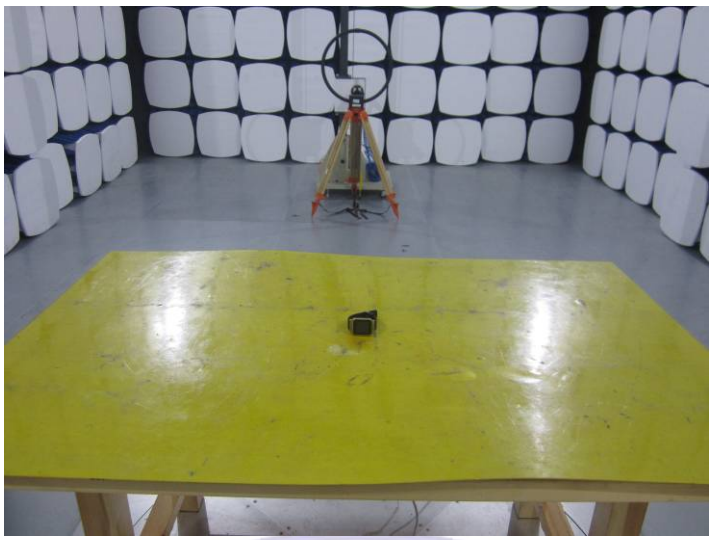
Frequency Stability under Voltage

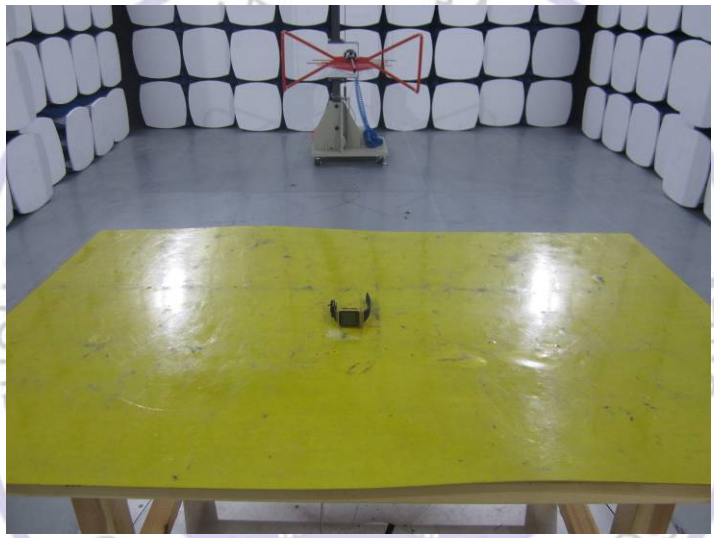
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Limit (Hz) |
|---|---|---|---|
| 4.200 | 1880.00 | -22 | ± 4700 |
| 3.700 | 1880.00 | -35 | ± 4700 |
| 3.600 | 1880.00 | 37 | ± 4700 |

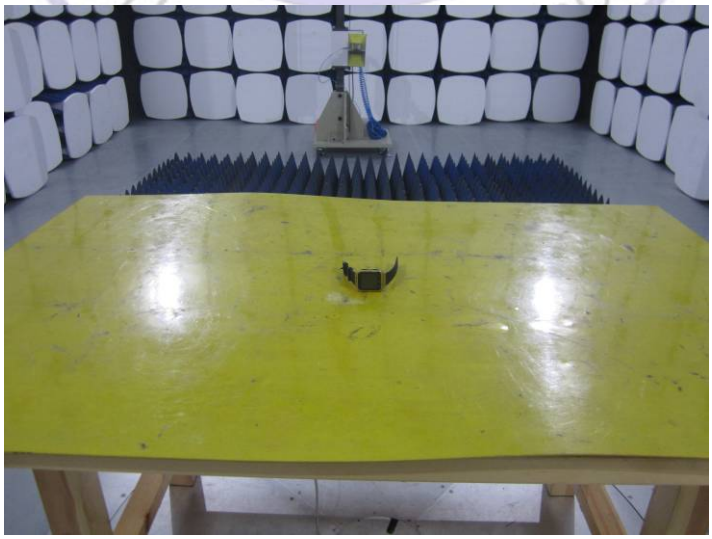
**Note:**

1. Normal Voltage: 3.7 V
2. Battery End Point(BEP) = 3.6V

# 5. Test Setup Photos of the EUT



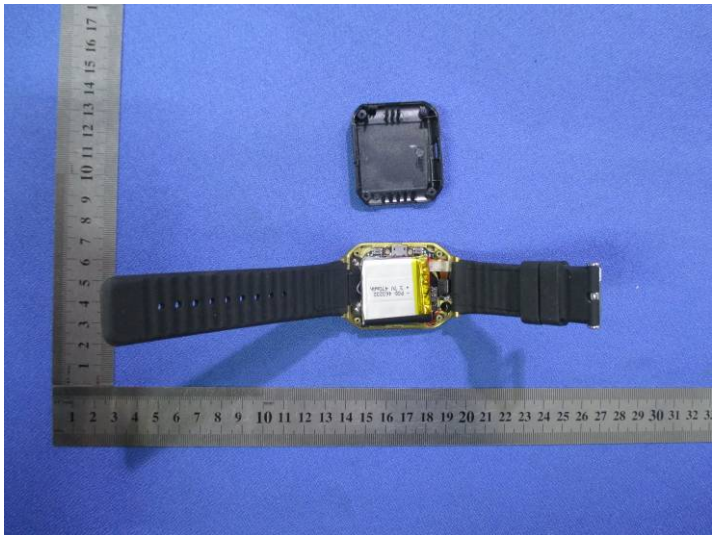


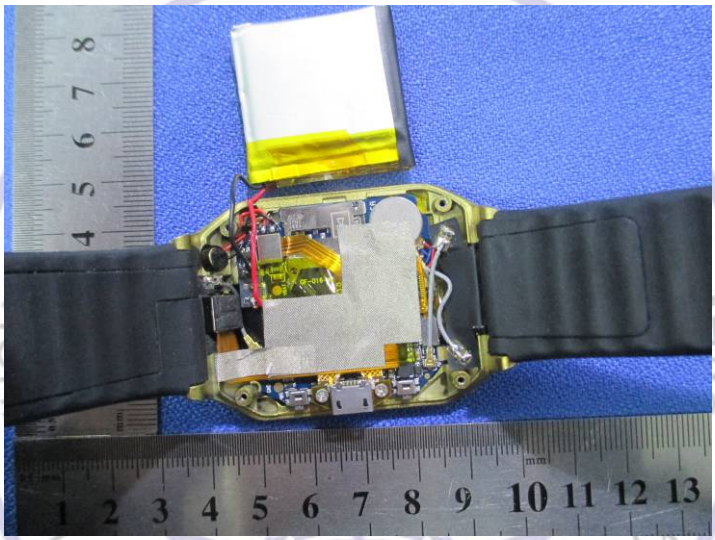


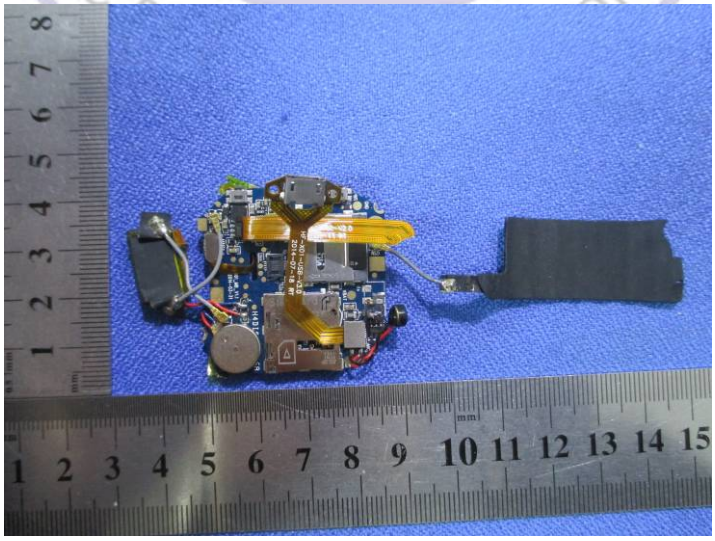
# 6. External and Internal Photos of the EUT

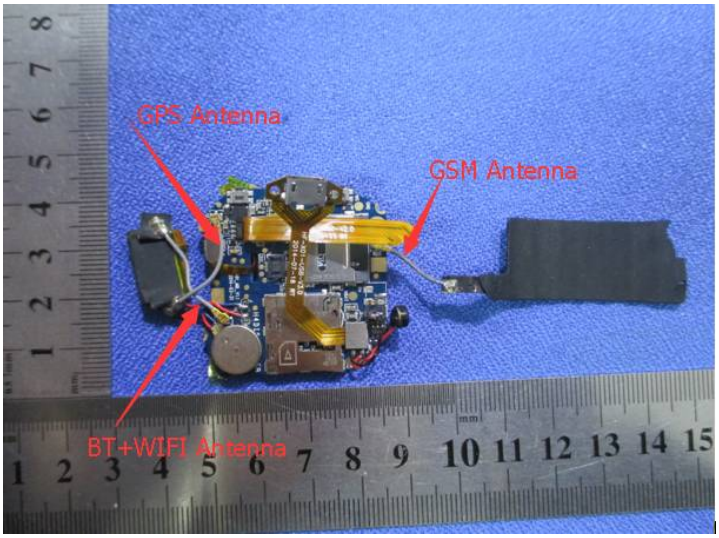
**External Photos of EUT**

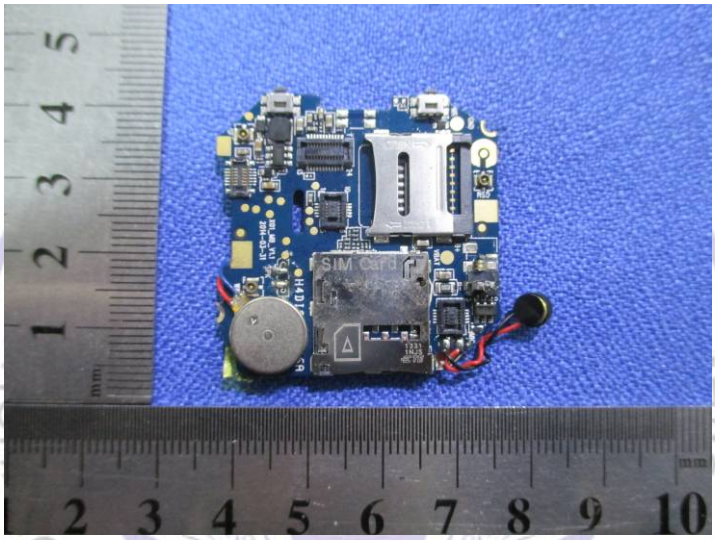
**Internal Photos of EUT**

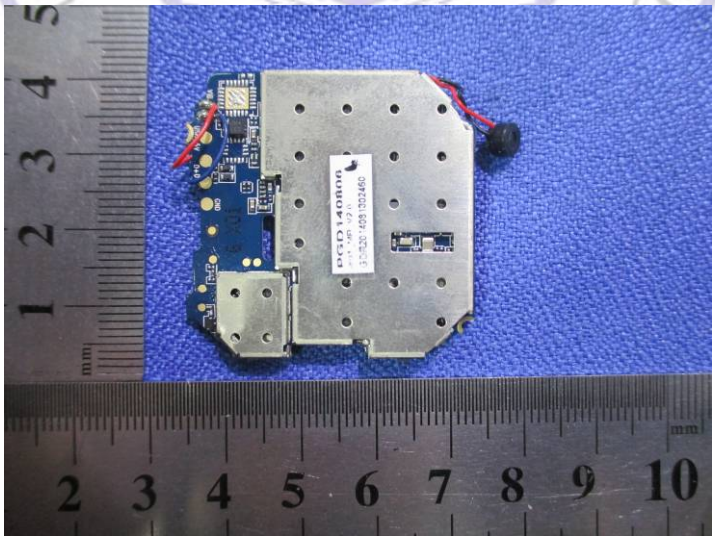


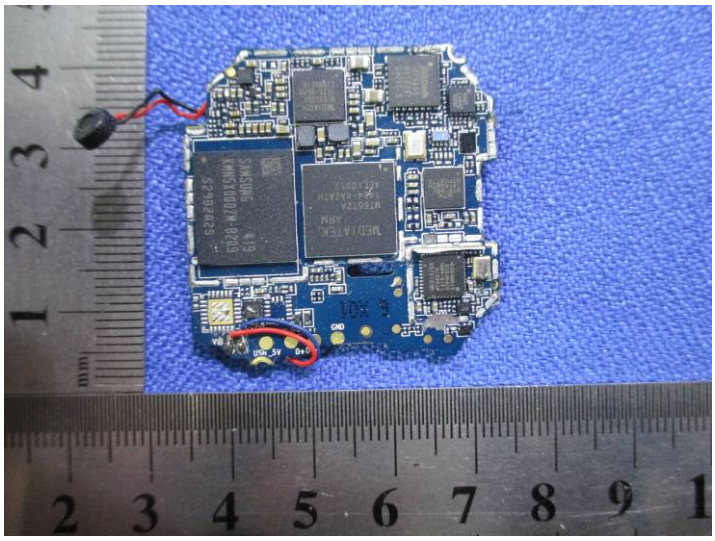


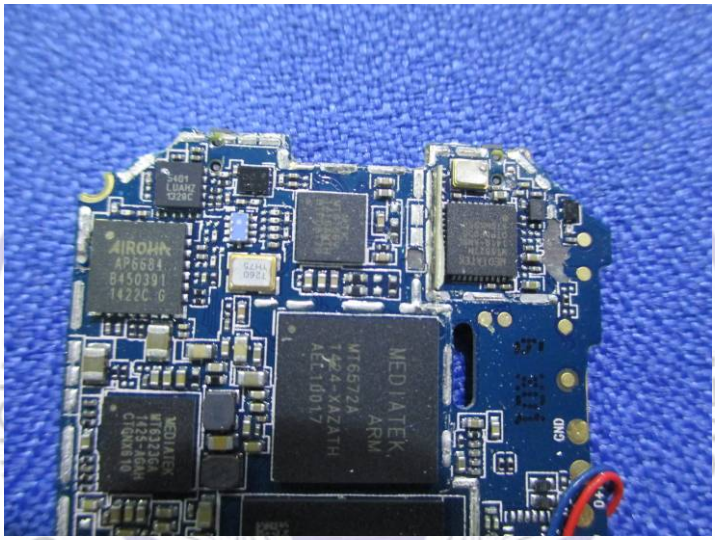



GPS Antenna
GSM Antenna
BT+WIFI Antenna


SIM card









.....End of Report.....