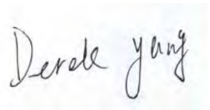
# FCC SAR TEST REPORT

| | |
|---|---|
| **Report No:** | ZR/2020/50024 |
| **Applicant:** | Xiaomi Communications Co., Ltd. |
| **Manufacturer:** | Xiaomi Communications Co., Ltd. |
| **Product Name:** | Mobile Phone |
| **Model No.(EUT):** | M2002J9R |
| **Trade Mark:** | MI |
| **FCC ID:** | 2AFZZJ9G |
| **Standards:** | FCC 47CFR §2.1093 |
| **Date of Receipt:** | 2020-05-22 |
| **Date of Test:** | 2020-05-23 to 2020-06-03 |
| **Date of Issue:** | 2020-06-15 |
| **Test conclusion:** | **PASS *** |

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Derek Yang

Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

# REVISION HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| ZR/2020/5002403 | 01 | Original | 2020-06-15 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# TEST SUMMARY

| Frequency Band | Maximum Reported SAR(W/kg) | | | |
|---|---|---|---|---|
| | **Head** | **Body-worn** | **Hotspot** | **Product specific 10g SAR** |
| GSM850 | 0.755 | 0.288 | 0.450 | / |
| GSM1900 | 0.843 | 0.322 | 0.616 | / |
| WCDMA Band II | 0.792 | 0.657 | 0.971 | 3.128 |
| WCDMA Band IV | 0.907 | 0.493 | 0.979 | 2.128 |
| WCDMA Band V | 1.062 | 0.292 | 0.549 | / |
| LTE Band 2 | 0.790 | 0.690 | 0.790 | **3.222** |
| LTE Band 4 | 0.638 | 0.493 | 0.929 | / |
| LTE Band 5 | 0.947 | 0.269 | 0.392 | / |
| LTE Band 7 | 0.512 | 0.545 | 0.542 | / |
| LTE Band 26 | 1.009 | 0.237 | 0.476 | / |
| LTE Band 38 | 0.585 | 0.336 | 0.523 | / |
| LTE Band 41 | 0.510 | 0.362 | 0.483 | / |
| WI-FI (2.4GHz) | 0.426 | 0.231 | 0.805 | / |
| WI-FI (5GHz) | **1.087** | **0.743** | **1.090** | 2.383 |
| BT | 0.175 | <0.100 | <0.100 | / |
| SAR Limited(W/kg) | 1.6 | | | 4.0 |
| Maximum Simultaneous Transmission SAR (W/kg) | | | | |
| Scenario | Head | Body-worn | Hotspot | Product specific 10g SAR |
| Sum SAR | 1.568 | 1.453 | 1.584 | 3.222 |
| SPLSR | N/A | N/A | N/A | N/A |
| SPLSR Limited | 0.04 | | | 0.1 |

Note:
The Simultaneous transmission SAR is the same test position of the WWAN antenna + WiFi/BT antenna.

**Approved & Released by**

Simon Ling

SAR Manager

**Tested by**

Jackson Li

SAR Engineer

# CONTENTS

# 1 General Information

## 1.1 Details of Client

| | |
|---|---|
| Applicant: | Xiaomi Communications Co., Ltd. |
| Address: | #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085 |
| Manufacturer: | Xiaomi Communications Co., Ltd. |
| Address: | #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085 |

## 1.2 Test Location

Company: SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

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## 1.3 Test Facility

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

**• CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

**• A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

**• VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

**• FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

**• Industry Canada (IC)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006

IC#: 4620C.

## 1.4 General Description of EUT

| | | | |
|---|---|---|---|
| Device Type : | portable device | | |
| Exposure Category: | uncontrolled environment / general population | | |
| Product Name: | Mobile Phone | | |
| Model No.(EUT): | M2002J9R | | |
| FCC ID: | 2AFZZJ9G | | |
| Trade Mark: | MI | | |
| Product Phase: | production unit | | |
| IMEI: | 863212050008231/863212050006573 | | |
| Hardware Version: | P2.2 | | |
| Software Version: | MIUI 11 | | |
| Antenna Type: | Integrated Antenna | | |
| Device Operating Configurations : | | | |
| Modulation Mode: | **GSM:** GMSK, 8PSK; **WCDMA:** QPSK, 16QAM; **LTE:** QPSK,16QAM,64QAM<br>**WIFI:** DSSS, OFDM; **BT:** GFSK, π/4DQPSK,8DPSK | | |
| Device Class: | B | | |
| GPRS Multi-slots Class: | 33 | EGPRS Multi-slots Class: | 33 |
| HSDPA UE Category: | 14 | HSUPA UE Category | 8 |
| DC-HSDPA UE Category: | 24 | | |
| Power Class | 4,tested with power level 5(GSM850) | | |
| | 1,tested with power level 0(GSM1900) | | |
| | 3, tested with power control “all 1”(WCDMA Band II/IV/V) | | |
| | 3, tested with power control Max Power(LTE Band 2/4/5/7/26/38/41) | | |
| Frequency Bands: | Band | Tx (MHz) | Rx (MHz) |
| | GSM850 | 824~849 | 869~894 |
| | GSM1900 | 1850~1910 | 1930~1990 |
| | WCDMA Band II | 1850~1910 | 1930~1990 |
| | WCDMA Band IV | 1710~1755 | 2110~2155 |
| | WCDMA Band V | 824~849 | 869~894 |
| | LTE Band 2 | 1850 ~1910 | 1930 ~1990 |
| | LTE Band 4 | 1710~1755 | 2110~2155 |
| | LTE Band 5 | 824~849 | 869-894 |
| | LTE Band 7 | 2500~2570 | 2620~2690 |
| | LTE Band 26 | 814~849 | 859~894 |
| | LTE Band 38 | 2570~2620 | 2570~2620 |
| | LTE Band 41 | 2496~2690 | 2496~2690 |
| | Bluetooth | 2400~2483.5 | 2400~2483.5 |
| | Wi-Fi 2.4G | 2402~2472 | 2402~2472 |
| | Wi-Fi 5G | 5150~5250 | 5150~5250 |
| | | 5250~5350 | 5250~5350 |
| | | 5470~5725 | 5470~5725 |
| | | 5725~5825 | 5725~5825 |

| | | |
|---|---|---|
| Battery Information: | Model: | BM4R |
| | Normal Voltage: | +3.87V |
| | Rated capacity: | 4060mAh |
| | Manufacturer: | Ningde Amperex Technology Limited |
| Headset Information: | Model: | EM023 |
| | Manufacturer: | Tiinlab Acoustic Technology (Shenzhen) Co., Ltd. |

**Remark:**
**We,** Xiaomi Communications Co., Ltd., declare on our sole responsibility for the product of M2002J9G & M2002J9R as below:

The differences are as below,

1. Dual SIM to single SIM
2. Adjusting the No.2 Antenna matching, it did not influence the Antenna's performance, only changed the peak efficiency point from 3400 MHz to 3700 MHz.
3. Support bands were update through SW, the bands listing as below:

| | M2002J9G | M2002J9R |
|---|---|---|
| HW | Dual SIM | Single SIM |
| | / | Adjusting the No.2 Antenna matching |
| Bands | GSM 2/3/5/8<br>WCDMA 1/2/4/5/8<br>LTE 1/2/3/4/5/7/8/20/28/38/40/41<br>2UL CA:3C,7C,38C,40C | GSM 2/3/5/8<br>WCDMA 1/2/4/5/8<br>LTE 1/2/3/4/5/7/8/18/20/26/28/38/40/41/42<br>2UL CA:3C,7C,38C,40C,41C,42C |

Except listings above, the others are all the same as previous version.

According to the difference description above, M2002J9R is all test for LTE Band 26, additional test data for LTE Band 41 UL CA, for the others same bands are tested the worst case on the original report ZR/2020/2002906.



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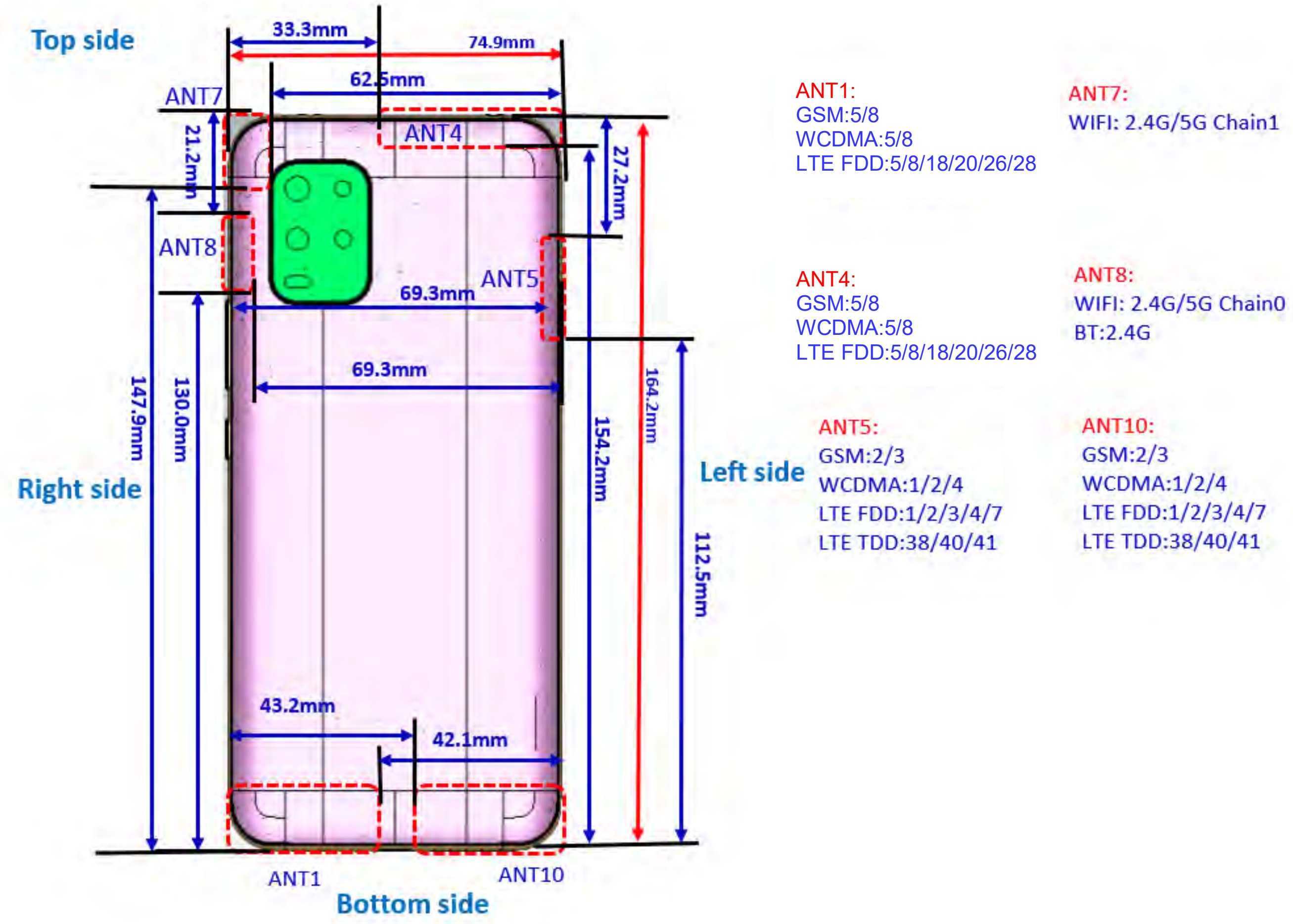
### 1.4.1 DUT Antenna Locations




Note:

1) The test device is a smart phone. The overall diagonal dimension of this device is 173 mm. Per KDB 648474 D04, because the diagonal distance of this device is ≥160mm, so it is a phablet.
2) WiFi 2.4G Ant7(Chain1) and WiFi 5G Ant8(Chain0) does not support SISO function.

According to the distance between LTE/WCDMA/GSM&WIFI&BT antennas and the sides of the EUT we can draw the conclusion that:

| EUT Sides for SAR Testing | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mode | Exposure Condition | Front | Back | Left | Right | Top | Bottom |
| Ant1 | Hotspot/Product specific 10g SAR | Yes | Yes | No | Yes | No | Yes |
| Ant4 | Hotspot/Product specific 10g SAR | Yes | Yes | Yes | No | Yes | No |
| Ant5 | Hotspot/Product specific 10g SAR | Yes | Yes | Yes | No | No | No |
| Ant10 | Hotspot/Product specific 10g SAR | Yes | Yes | Yes | No | No | Yes |
| WIFI 2.4G Ant8 (Chain0) & BT Ant8 | Hotspot/Product specific 10g SAR | Yes | Yes | No | Yes | Yes | No |
| WIFI 2.4G MIMO (Ant7+ Ant8) | Hotspot/Product specific 10g SAR | Yes | Yes | No | Yes | Yes | No |
| WIFI 5G Ant7(Chain1) | Hotspot/Product specific 10g SAR | Yes | Yes | No | Yes | Yes | No |
| WIFI 5G MIMO (Ant7+ Ant8) | Hotspot/Product specific 10g SAR | Yes | Yes | No | Yes | Yes | No |

Table 1： EUT Sides for SAR Testing

Note:

1) When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
2) WWAN antenna(Ant1/4/5/10) can’t transmit simultaneously which will be chosen based on the RSSI. Only one antenna can be used for 2G/3G/4G transmission at a time.

### 1.4.2 LTE CA additional specification

The device supports downlink and intra-band contiguous uplink LTE Carrier Aggregation (CA). When carrier aggregation applies, implementation and measurement details for the following are necessary.

a) Intra-band carrier aggregation requirements for uplink.

b) Intra-band carrier aggregation requirements for downlink.

The possible downlink and uplink LTE CA combinations supported by this device are as below tables per 3GPP TS 36.101 V15.4.0. The conducted power measurement results of downlink and uplink LTE CA are provided in Section 8 of this report per 3GPP TS 36.521-1 V14.4.0. The downlink LTE CA SAR test is not required since the maximum output power for downlink LTE CA was not more than 0.25dB higher than the maximum output power for without downlink LTE CA.

SAR test procedure for intra-band contiguous UL LTE CA is as below:

1)Maximum output power is measured for each UL CA configuration for the required test channels described in KDB 941225 D05

﹣UL PCC configuration is determined by the required test channel

﹣SCC and subsequent CCs are added alternatively to either side of the PCC or within the transmission band for channels at the ends of a frequency band.

2)SAR for UL CA is required in each exposure condition and frequency band combination

3)For this device, as the maximum output for Intra-band uplink LTE CA is ≤ standalone LTE mode (without CA),

- PCC is configured according to the highest standalone SAR configuration tested.

- SCC and subsequent CCs are configured according to procedures used for power measurement and parameters (BW, RB etc.) similar to that used for the PCC

4)When the reported SAR for UL CA configuration, described above, is > 1.2 W/kg, UL CA SAR is also required for all required test channels (PCC based)

5) UL CA SAR is also required for standalone SAR configurations > 1.2 W/kg when they are scaled to the UL CA power level.

Intra-band contiguous CA operating bands：

| E-UTRA CA Band | E-UTRA Band | Uplink (UL) operating band<br>BS receive / UE transmit<br>$F_{UL\_low} – F_{UL\_high}$ | | | Downlink (DL) operating band<br>BS transmit / UE receive<br>$F_{DL\_low} – F_{DL\_high}$ | | | Duplex Mode |
|---|---|---|---|---|---|---|---|---|
| CA_7 | 7 | 2500 MHz | – | 2570 MHz | 2620 MHz | – | 2690 MHz | FDD |
| CA_38 | 38 | 2570 MHz | – | 2620 MHz | 2570 MHz | – | 2620 MHz | TDD |
| CA_41 | 41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |

contiguous intra-band CA：

| | E-UTRA CA configuration / Bandwidth combination set | | | | | | |
|---|---|---|---|---|---|---|---|
| E-UTRA CA configuration | Uplink CA configurations (NOTE 3) | Component carriers in order of increasing carrier frequency | | | | Maximum aggregated bandwidth [MHz] | Bandwidth combination set |
| | | Channel bandwidths for carrier [MHz] | Channel bandwidths for carrier [MHz] | Channel bandwidths for carrier [MHz] | Channel bandwidths for carrier [MHz] | | |
| CA_7C | CA_7C | 15 | 15 | | | 40 | 0 |
| | | 20 | 20 | | | | |
| | | 10 | 20 | | | 40 | 1 |
| | | 15 | 15, 20 | | | | |
| | | 20 | 10, 15, 20 | | | | |
| | | 15 | 10, 15 | | | 40 | 2 |
| | | 20 | 15, 20 | | | | |
| CA_38C | CA_38C | 15 | 15 | | | 40 | 0 |
| | | 20 | 20 | | | | |
| CA_41C | CA_41C | 10 | 20 | | | 40 | 0 |
| | | 15 | 15, 20 | | | | |
| | | 20 | 10, 15, 20 | | | | |
| | | 5, 10 | 20 | | | 40 | 1 |
| | | 15 | 15, 20 | | | | |
| | | 20 | 5, 10, 15, 20 | | | | |
| | | 10 | 15, 20 | | | 40 | 2 |
| | | 15 | 10, 15, 20 | | | | |
| | | 20 | 10, 15, 20 | | | | |
| | | 10 | 20 | | | 40 | 3 |
| | | 20 | 20 | | | | |

Test frequencies for CA_7C：

| Range | CC-Combo / NRB_agg [RB] | CC1 Note1 | | | | | CC2 Note1 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BW [RB] | $N_{UL}$ | $f_{UL}$ [MHz] | $N_{DL}$ | $f_{DL}$ [MHz] | BW [RB] | $N_{UL}$ | $f_{UL}$ [MHz] | $N_{DL}$ | $f_{DL}$ [MHz] |
| Low | 50+100 | 50 | 20805 | 2505.5 | 2805 | 2625.5 | 100 | 20949 | 2519.9 | 2949 | 2639.9 |
| | | 100 | 20850 | 2510 | 2850 | 2630 | 50 | 20994 | 2524.4 | 2994 | 2644.4 |
| | 75+75 | 75 | 20825 | 2507.5 | 2825 | 2627.5 | 75 | 20975 | 2522.5 | 2975 | 2642.5 |
| | 75+100 | 75 | 20828 | 2507.8 | 2828 | 2627.8 | 100 | 20999 | 2524.9 | 2999 | 2644.9 |
| | | 100 | 20850 | 2510 | 2850 | 2630 | 75 | 21021 | 2527.1 | 3021 | 2647.1 |
| | 100+100 | 100 | 20850 | 2510 | 2850 | 2630 | 100 | 21048 | 2529.8 | 3048 | 2649.8 |
| Mid | 50+100 | 50 | 21006 | 2525.6 | 3006 | 2645.6 | 100 | 21150 | 2540 | 3150 | 2660 |
| | | 100 | 21051 | 2530.1 | 3051 | 2650.1 | 50 | 21195 | 2544.5 | 3195 | 2664.5 |
| | 75+75 | 75 | 21025 | 2527.5 | 3025 | 2647.5 | 75 | 21175 | 2542.5 | 3175 | 2662.5 |
| | 75+100 | 75 | 21003 | 2525.3 | 3003 | 2645.3 | 100 | 21174 | 2542.4 | 3174 | 2662.4 |
| | | 100 | 21026 | 2527.6 | 3026 | 2647.6 | 75 | 21197 | 2544.7 | 3197 | 2664.7 |
| | 100+100 | 100 | 21001 | 2525.1 | 3001 | 2645.1 | 100 | 21199 | 2544.9 | 3199 | 2664.9 |
| High | 50+100 | 50 | 21206 | 2545.6 | 3206 | 2665.6 | 100 | 21350 | 2560 | 3350 | 2680 |
| | | 100 | 21251 | 2550.1 | 3251 | 2670.1 | 50 | 21395 | 2564.5 | 3395 | 2684.5 |
| | 75+75 | 75 | 21225 | 2547.5 | 3225 | 2667.5 | 75 | 21375 | 2562.5 | 3375 | 2682.5 |
| | 75+100 | 75 | 21179 | 2542.9 | 3179 | 2662.9 | 100 | 21350 | 2560 | 3350 | 2680 |
| | | 100 | 21201 | 2545.1 | 3201 | 2665.1 | 75 | 21372 | 2562.2 | 3372 | 2682.2 |
| | 100+100 | 100 | 21152 | 2540.2 | 3152 | 2660.2 | 100 | 21350 | 2560 | 3350 | 2680 |
| Note 1: Carriers in increasing frequency order. | | | | | | | | | | | |

Test frequencies for CA_38C：

| Range | CC-Combo / NRB_agg [RB] | CC1 Note1 | | | CC2 Note1 | | |
|---|---|---|---|---|---|---|---|
| | | BW [RB] | $N_{UL/DL}$ | $f_{UL/DL}$ [MHz] | BW [RB] | $N_{UL/DL}$ | $f_{UL/DL}$ [MHz] |
| Low | 75+75 | 75 | 37825 | 2577.5 | 75 | 37975 | 2592.5 |
| | 100+100 | 100 | 37850 | 2580 | 100 | 38048 | 2599.8 |
| Mid | 75+75 | 75 | 37925 | 2587.5 | 75 | 38075 | 2602.5 |
| | 100+100 | 100 | 37901 | 2585.1 | 100 | 38099 | 2604.9 |
| High | 75+75 | 75 | 38025 | 2597.5 | 75 | 38175 | 2612.5 |
| | 100+100 | 100 | 37952 | 2590.2 | 100 | 38150 | 2610 |
| Note 1: Carriers in increasing frequency order. | | | | | | | |

Test frequencies for CA_41C:

| Range | CC-Combo / NRB_agg [RB] | CC1 Note1 | | | CC2 Note1 | | |
|---|---|---|---|---|---|---|---|
| | | BW [RB] | $N_{UL/DL}$ | $f_{UL/DL}$ [MHz] | BW [RB] | $N_{UL/DL}$ | $f_{UL/DL}$ [MHz] |
| Low | 25+100 | 25 | 40065 | 2537.5 | 100 | 40182 | 2549.2 |
| | | 100 | 40140 | 2545 | 25 | 40257 | 2556.7 |
| | 50+100 | 50 | 40090 | 2540 | 100 | 40234 | 2554.4 |
| | | 100 | 40140 | 2545 | 50 | 40284 | 2559.4 |
| | 75+75 | 75 | 40115 | 2542.5 | 75 | 40265 | 2557.5 |
| | 75+100 | 75 | 40115 | 2542.5 | 100 | 40286 | 2559.6 |
| | | 100 | 40140 | 2545 | 75 | 40311 | 2562.1 |
| | 100+100 | 100 | 40140 | 2545 | 100 | 40338 | 2564.8 |
| Mid | 25+100 | 25 | 40548 | 2585.8 | 100 | 40665 | 2597.5 |
| | | 100 | 40615 | 2592.5 | 25 | 40732 | 2604.2 |
| | 50+100 | 50 | 40546 | 2585.6 | 100 | 40690 | 2560 |
| | | 100 | 40591 | 2590.1 | 50 | 40735 | 2604.5 |
| | 75+75 | 75 | 40565 | 2587.5 | 75 | 40715 | 2602.5 |
| | 75+100 | 75 | 40543 | 2585.3 | 100 | 40714 | 2602.4 |
| | | 100 | 40566 | 2587.6 | 75 | 40737 | 2604.7 |
| | 100+100 | 100 | 40541 | 2585.1 | 100 | 40739 | 2604.9 |
| High | 25+100 | 25 | 41023 | 2633.3 | 100 | 41140 | 2645 |
| | | 100 | 41098 | 2640.8 | 25 | 41215 | 2652.5 |
| | 50+100 | 50 | 40996 | 2630.6 | 100 | 41140 | 2645 |
| | | 100 | 41046 | 2635.6 | 50 | 41190 | 2650 |
| | 75+75 | 75 | 41014 | 2632.5 | 75 | 41165 | 2647.5 |
| | 75+100 | 75 | 40969 | 2627.9 | 100 | 41140 | 2645 |
| | | 100 | 40994 | 2630.4 | 75 | 41165 | 2647.5 |
| | 100+100 | 100 | 40942 | 2625.2 | 100 | 41140 | 2645 |
| Note 1: Carriers in increasing frequency order. | | | | | | | |

### 1.4.3 Power reduction specification

This device uses a single fixed level of power reduction through static table look-up for SAR compliance and it is triggered by a single event or operation

1) A fixed level power reduction is applied for some frequency bands when hotspot mode becomes active. When the hotspot is disabled, the power value will be recovered.
2) A fixed level power reduction is applied for some frequency bands when simultaneously transmitting with the other antennas in certain simultaneous transmission conditions. The standalone SAR compliance still uses the standalone SAR results tested at the maximum output power level without any power reduction
3) A fixed level power reduction is applied for some frequency bands when handset operate "held to the ear" condition, the power reduction triggered by audio receiver detection. The audio receiver detection is used to determine head or body scenario.

The following tables summarize the key power reduction information. The detailed full power which is the Max. power the state can use and reduced tune-up specifications and conducted power measurement results are provided in Section 8 of this report.

| Ant10 Power Level(dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Power Reduction Scenario | WCDMA Band II | WCDMA Band IV | LTE Band 2 | LTE Band 4 | LTE Band 7 | LTE Band 38 | LTE Band 41 |
| Hotspot off | 24.5 | 24.5 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Hotspot on | 22.0 | 23.0 | 21.0 | 23.0 | 20.0 | 22.0 | 21.5 |

| Ant4 Power Level(dBm) | | | | |
|---|---|---|---|---|
| Power Reduction Scenario | GSM 850 | WCDMA Band V | LTE Band 5 | LTE Band 26 |
| Receiver off/ Hotspot off | 33.5 | 24.5 | 24.5 | 25.0 |
| Receiver on/ Hotspot on | 29.5 | 22.5 | 22.5 | 22.5 |

| Ant5 Power Level(dBm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Power Reduction Scenario | GSM 1900 | WCDMA Band II | WCDMA Band IV | LTE Band 2 | LTE Band 4 | LTE Band 7 | LTE Band 38 | LTE Band 41 |
| Receiver off/ Hotspot off | 30.5 | 23.0 | 24.5 | 23.0 | 23.5 | 21.0 | 23.0 | 23.5 |
| Receiver on/ Hotspot on | 27.0 | 16.5 | 18.5 | 16.5 | 17.5 | 14.5 | 17.5 | 16.5 |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| WiFi antenna Power Level(dBm) | | | | | |
|---|---|---|---|---|---|
| Power Reduction Scenario | | Receiver off | WWAN transmit simultaneusly with WiFi(Receiver off) | Receiver on | WWAN transmit simultaneusly with WiFi(Receiver on) |
| WiFi 2.4G Ant8(Chain0) | 802.11 b | 19.5 | 19.5 | 15.5 | 15.5 |
| | 802.11 g | 19.5 | 19.5 | 15.5 | 15.5 |
| | 802.11 n 20M | 16.5 | 16.5 | 12.5 | 12.5 |
| | 802.11 n 40M | 14.5 | 14.5 | 10.5 | 10.5 |
| WiFi 2.4G MIMO (Ant7+Ant8) | 802.11 b | 22.5 | 22.5 | 18.5 | 18.5 |
| | 802.11 g | 22.5 | 22.5 | 18.5 | 18.5 |
| | 802.11 n 20M | 19.5 | 19.5 | 15.5 | 15.5 |
| | 802.11 n 40M | 17.5 | 17.5 | 13.5 | 13.5 |
| WiFi 5G Ant7(Chain1) | 802.11a | 18.0 | 16.5 | 13.5 | 11.5 |
| | 802.11n 20M | 17.0 | 15.5 | 12.5 | 10.5 |
| | 802.11n 40M | 17.0 | 15.5 | 12.5 | 10.5 |
| | 802.11ac 20M | 18.0 | 16.5 | 13.5 | 11.5 |
| | 802.11ac 40M | 17.0 | 15.5 | 12.5 | 10.5 |
| | 802.11ac 80M | 16.0 | 14.0 | 11.0 | 9.0 |
| WiFi 5G MIMO (Ant7+Ant8) | 802.11a | 21.0 | 19.5 | 16.5 | 14.5 |
| | 802.11n 20M | 20.0 | 18.5 | 15.5 | 13.5 |
| | 802.11n 40M | 20.0 | 18.5 | 15.5 | 13.5 |
| | 802.11ac 20M | 21.0 | 19.5 | 16.5 | 14.5 |
| | 802.11ac 40M | 20.0 | 18.5 | 15.5 | 13.5 |
| | 802.11ac 80M | 19.0 | 17.0 | 14.0 | 12.0 |

## 1.5 Test Specification

| Identity | Document Title |
|---|---|
| FCC 47CFR §2.1093 | Radiofrequency Radiation Exposure Evaluation: Portable Devices |
| IEEE Std C95.1 – 1992 | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz. |
| IEEE 1528-2013 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| KDB 941225 D01 | 3G SAR Measurement Procedures v03r01 |
| KDB 941225 D05 | SAR for LTE Devices v02r05 |
| KDB 941225 D05A | LTE Rel.10 KDB Inquiry Sheet v01r02 |
| KDB 941225 D06 | Hotspot Mode SAR v02r01 |
| KDB 248227 D01 | SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02 |
| KDB 648474 D04 | Handset SAR v01r03 |
| KDB447498 D01 | General RF Exposure Guidance v06 |
| KDB 865664 D01 | SAR Measurement 100 MHz to 6 GHz v01r04 |
| KDB 865664 D02 | RF Exposure Reporting v01r02 |
| KDB 690783 D01 | SAR Listings on Grants v01r03 |

## 1.6 RF exposure limits

| Human Exposure | Uncontrolled Environment General Population | Controlled Environment Occupational |
|---|---|---|
| **Spatial Peak SAR*** (Brain*Trunk) | **1.60 mW/g** | 8.00 mW/g |
| **Spatial Average SAR**** (Whole Body) | 0.08 mW/g | 0.40 mW/g |
| **Spatial Peak SAR***** (Hands/Feet/Ankle/Wrist) | **4.00 mW/g** | 20.00 mW/g |

**Notes:**
* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time
** The Spatial Average value of the SAR averaged over the whole body.
*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
**Uncontrolled Environments** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.
**Controlled Environments** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)

## 2 Laboratory Environment

| | |
|---|---|
| Temperature | Min. = 18°C, Max. = 25 °C |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5 Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards.<br>Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

Table 2： The Ambient Conditions

# 3 SAR Measurements System Configuration

## 3.1 The SAR Measurement System

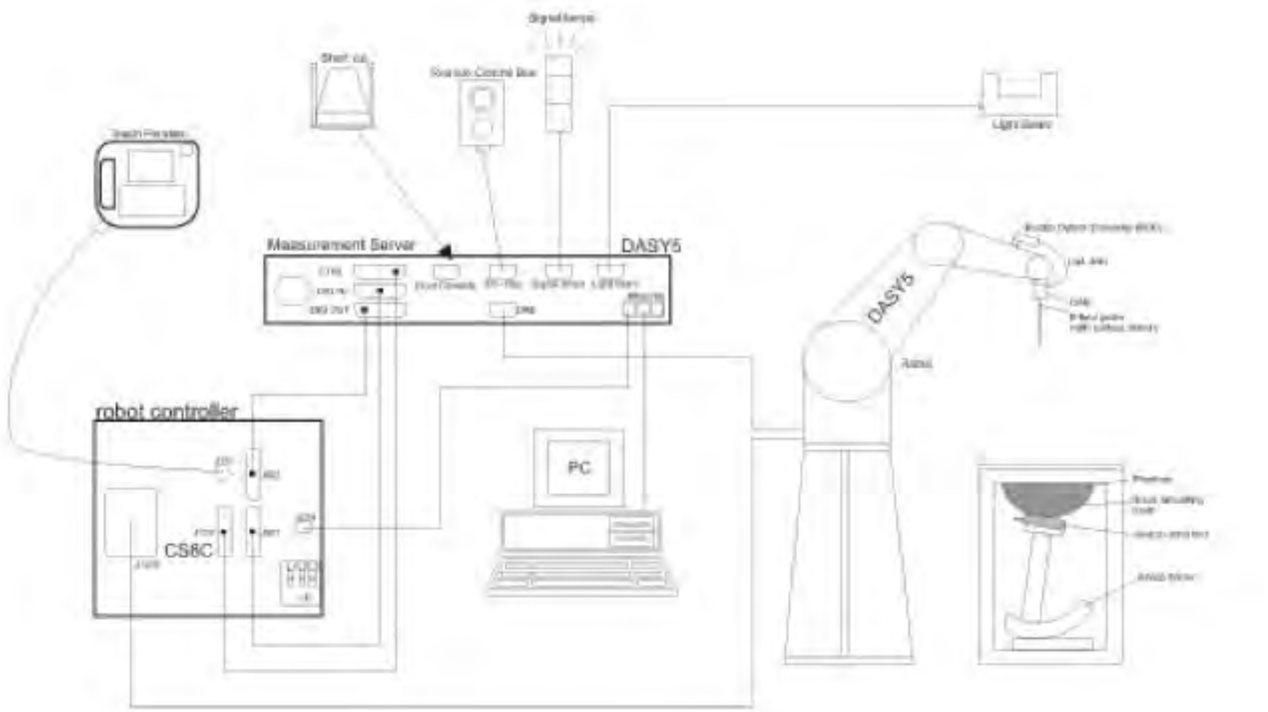
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= $\sigma$ (|Ei|2)/ $\rho$ where $\sigma$ and $\rho$ are the conductivity and mass density of the tissue-Simulate.

The DASY5 system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.




F-1. SAR Measurement System Configuration

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.

## 3.2 Isotropic E-field Probe EX3DV4

| | |
|---|---|
|  | Symmetrical design with triangular core<br>Built-in shielding against static charges<br>PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| **Calibration** | ISO/IEC 17025 calibration service available. |
| **Frequency** | 10 MHz to > 6 GHz<br>Linearity: ± 0.2 dB (30 MHz to 6 GHz) |
| **Directivity** | ± 0.3 dB in TSL (rotation around probe axis)<br>± 0.5 dB in TSL (rotation normal to probe axis) |
| **Dynamic Range** | 10 µW/g to > 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 µW/g) |
| **Dimensions** | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |
| **Application** | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |
| **Compatibility** | DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI |

## 3.3 Data Acquisition Electronics (DAE)

| | |
|---|---|
| **Model** | DAE |
| **Construction** | Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop. |
| **Measurement Range** | -100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV) |
| **Input Offset Voltage** | < 5μV (with auto zero) |
| **Input Bias Current** | < 50 f A |
| **Dimensions** | 60 x 60 x 68 mm |

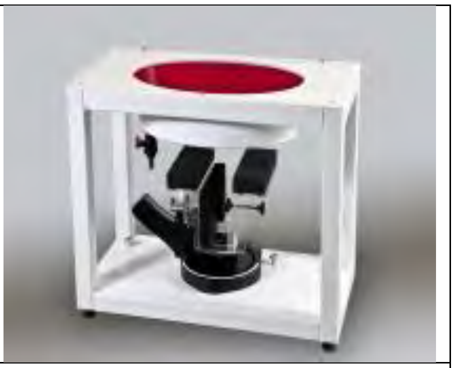
## 3.4 SAM Twin Phantom

| | |
|---|---|
| **Material** | Vinylester, glass fiber reinforced (VE-GF) |
| **Liquid Compatibility** | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) |
| **Shell Thickness** | 2 ± 0.2 mm (6 ± 0.2 mm at ear point) |
| **Dimensions (incl. Wooden Support)** | Length: 1000 mm<br>Width: 500 mm<br>Height: adjustable feet |
| **Filling Volume** | approx. 25 liters |
| **Wooden Support** | SPEAG standard phantom table |

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

## 3.5 ELI Phantom

| | | |
|---|---|---|
| **Material** | Vinylester, glass fiber reinforced (VE-GF) |  |
| **Liquid Compatibility** | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) | |
| **Shell Thickness** | 2.0 ± 0.2 mm (bottom plate) | |
| **Dimensions** | Major axis: 600 mm<br>Minor axis: 400 mm | |
| **Filling Volume** | approx. 30 liters | |
| **Wooden Support** | SPEAG standard phantom table | |
| Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.<br><br>ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure. | | |

## 3.6 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

## 3.7 Measurement procedure

### 3.7.1 Scanning procedure

#### Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

#### Step 2: *Area scan*

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

#### Step 3: *Zoom scan*

Around this point, a volume of 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.

| | | | ≤ 3 GHz | > 3 GHz |
|---|---|---|---|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | | | 5 ± 1 mm | ½·δ·ln(2) ± 0.5 mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location | | | 30° ± 1° | 20° ± 1° |
| Maximum area scan spatial resolution: $\Delta x_{Area}$, $\Delta y_{Area}$ | | | ≤ 2 GHz: ≤ 15 mm<br>2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm<br>4 – 6 GHz: ≤ 10 mm |
| | | | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |
| Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$, $\Delta y_{Zoom}$ | | | ≤ 2 GHz: ≤ 8 mm<br>2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm*<br>4 – 6 GHz: ≤ 4 mm* |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm<br>4 – 5 GHz: ≤ 3 mm<br>5 – 6 GHz: ≤ 2 mm |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface | ≤ 4 mm | 3 – 4 GHz: ≤ 3 mm<br>4 – 5 GHz: ≤ 2.5 mm<br>5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | ≤ 1.5·$\Delta z_{Zoom}(n-1)$ | |
| Minimum zoom scan volume | x, y, z | | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm<br>4 – 5 GHz: ≥ 25 mm<br>5 – 6 GHz: ≥ 22 mm |

## Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

### 3.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### 3.7.3 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity Normi, ai0, ai1, ai2
- Conversion factor ConvFi
- Diode compression point Dcpi
Device parameters: - Frequency f
- Crest factor cf
Media parameters: - Conductivity ε
- Density ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With Vi = compensated signal of channel i ( i = x, y, z )
Ui = input signal of channel i ( i = x, y, z )
cf = crest factor of exciting field (DASY parameter)
dcp i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ= conductivity in [mho/m] or [Siemens/m]
ε= equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}{}^2{}_2 / 3770 \text{ or } P_{pwe} = H_{tot}^2 \cdot 37.7$$

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

# 4 SAR measurement variability and uncertainty

## 4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

## 4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

# 5 Description of Test Position

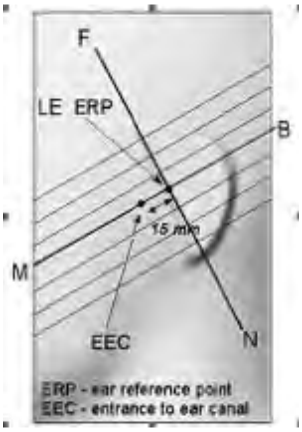
## 5.1 Head Exposure Condition

### 5.1.1 SAM Phantom Shape

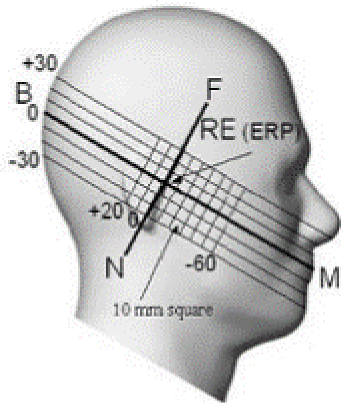

F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup.

Note: The centre strip including the nose region has a different thickness tolerance.


F-4. Sagittally bisected phantom with extended perimeter (shown placed on its side as used for SAR measurements)

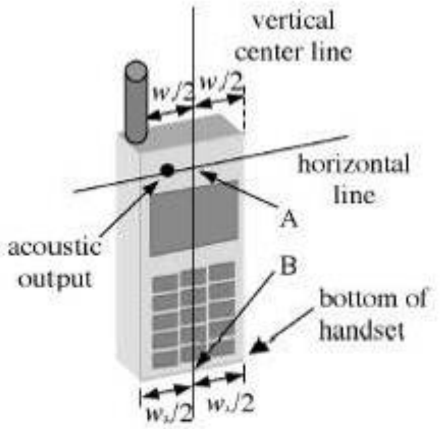



F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations

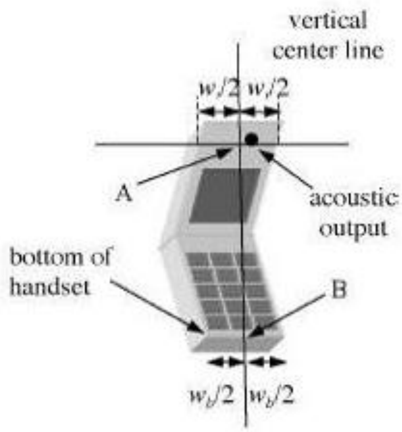



F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations

### 5.1.2 EUT constructions




F-7. Handset vertical and horizontal reference lines-“fixed case”




F-8. Handset vertical and horizontal reference lines-“clam-shell case”

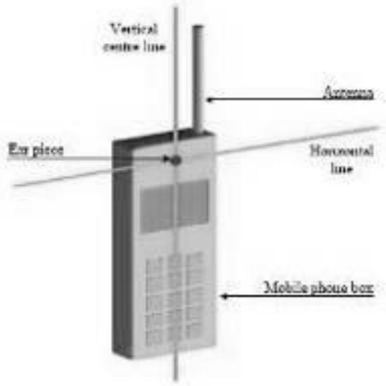
### 5.1.3 Definition of the “cheek” position

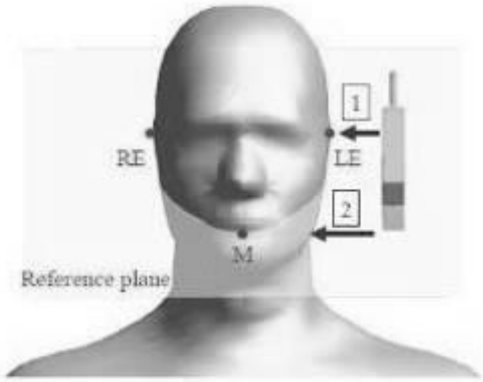
a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE.

b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until telephone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

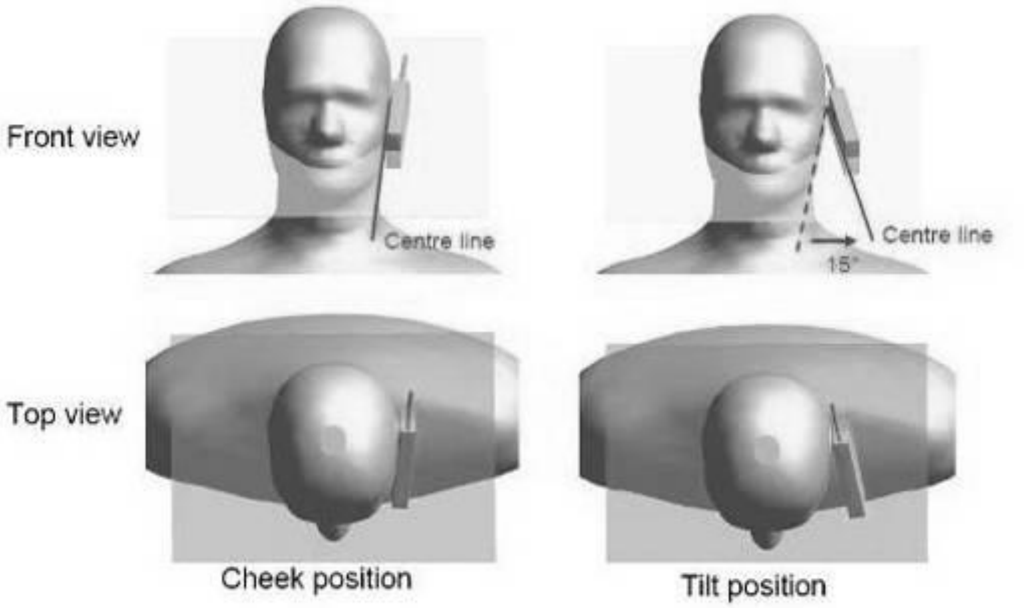
### 5.1.4 Definition of the "tilted" position

a) Position the device in the "cheek" position described above;
b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.




F-9. **Definition of the reference lines and points, on the phone and on the phantom and initial position**




F-10. **"Cheek" and "tilt" positions of the mobile phone on the left side**

## 5.2 Body Exposure Condition

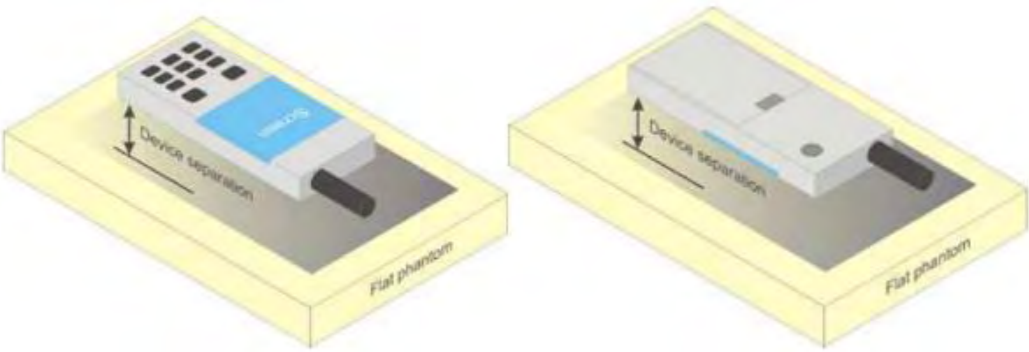
### 5.2.1 Body-worn accessory exposure conditions

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.




F-11. **Test positions for body-worn devices**

### 5.2.2 Wireless Router exposure conditions

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. For devices with form factors smaller than 9 cm x 5 cm, a test separation distance of 5 mm is required.

## 5.3 Extremity exposure conditions

Per FCC KDB 648474D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the device is marketed as “Phablet”.
The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for Product Specific 10-g SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, Product Specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

Due to the SAR result, Due to the SAR result, only the following frequency bands need to test with 0mm for the Product Specific 10-g SAR, the others are not required.

**WCDMA Band II:**

| Test position | Test mode | Test ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | Power drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR 1-g (W/kg) | Product Specific 10-g SAR SAR Exclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| Hotspot Test data(Separate 10mm) | | | | | | | | | | |
| Front side | RMC | 9400/1880 | 1:1 | 0.399 | 0.15 | 20.51 | 24.50 | 2.506 | 1.000 | Yes |
| Back side | RMC | 9400/1880 | 1:1 | 0.462 | -0.16 | 20.51 | 24.50 | 2.506 | 1.158 | Yes |
| Left side | RMC | 9400/1880 | 1:1 | 0.167 | -0.01 | 20.51 | 24.50 | 2.506 | 0.419 | Yes |
| Bottom side | RMC | 9262/1852.4 | 1:1 | 0.576 | 0.06 | 20.51 | 24.50 | 2.506 | 1.444 | No |
| Bottom side | RMC | 9400/1880 | 1:1 | 0.692 | 0.06 | 20.53 | 24.50 | 2.495 | 1.726 | No |
| Bottom side | RMC | 9538/1907.6 | 1:1 | 0.581 | -0.14 | 20.46 | 24.50 | 2.535 | 1.473 | No |

**WCDMA Band IV:**

| Test position | Test mode | Test ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | Power drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR 1-g (W/kg) | Product Specific 10-g SAR SAR Exclusion |
|---|---|---|---|---|---|---|---|---|---|---|
| Hotspot Test data(Separate 10mm) | | | | | | | | | | |
| Front side | RMC | 1412/1732.4 | 1:1 | 0.452 | -0.07 | 21.51 | 24.50 | 1.991 | 0.900 | Yes |
| Back side | RMC | 1412/1732.4 | 1:1 | 0.487 | 0.05 | 21.51 | 24.50 | 1.991 | 0.969 | Yes |
| Left side | RMC | 1412/1732.4 | 1:1 | 0.188 | 0.09 | 21.51 | 24.50 | 1.991 | 0.374 | Yes |
| Bottom side | RMC | 1412/1732.4 | 1:1 | 0.614 | 0.05 | 21.51 | 24.50 | 1.991 | 1.222 | No |
| Bottom side | RMC | 1312/1712.4 | 1:1 | 0.554 | 0.04 | 21.37 | 24.50 | 2.056 | 1.139 | Yes |
| Bottom side | RMC | 1513/1752.6 | 1:1 | 0.685 | 0.01 | 21.45 | 24.50 | 2.018 | 1.383 | No |

**LTE Band 2:**

| Test position | Test mode | | | Test ch./Freq. | Duty Cycle | SAR (W/kg) 1-g | Power drift (dB) | Conducted Power (dBm) | Tune up Limit (dBm) | Scaled factor | Scaled SAR 1-g (W/kg) | Product Specific 10-g SAR SAR Exclusion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BW. | Modulation | RB Size_ RB offset | | | | | | | | | |
| Hotspot Test data(Separate 10mm 1RB) | | | | | | | | | | | | |
| Front side | 20 | QPSK | 1_0 | 18900/1880 | 1:1 | 0.306 | 0.10 | 19.66 | 24.00 | 2.716 | 0.831 | Yes |
| Back side | 20 | QPSK | 1_0 | 18900/1880 | 1:1 | 0.351 | 0.03 | 19.66 | 24.00 | 2.716 | 0.953 | Yes |
| Left side | 20 | QPSK | 1_0 | 18900/1880 | 1:1 | 0.122 | 0.17 | 19.66 | 24.00 | 2.716 | 0.331 | Yes |
| Bottom side | 20 | QPSK | 1_0 | 18900/1880 | 1:1 | 0.460 | 0.02 | 19.66 | 24.00 | 2.716 | 1.250 | No |
| Hotspot Test data(Separate 10mm 50%RB) | | | | | | | | | | | | |
| Front side | 20 | QPSK | 50_0 | 18900/1880 | 1:1 | 0.305 | 0.06 | 19.55 | 23.00 | 2.213 | 0.675 | Yes |
| Back side | 20 | QPSK | 50_0 | 18900/1880 | 1:1 | 0.347 | 0.15 | 19.55 | 23.00 | 2.213 | 0.768 | Yes |
| Left side | 20 | QPSK | 50_0 | 18900/1880 | 1:1 | 0.129 | 0.05 | 19.55 | 23.00 | 2.213 | 0.285 | Yes |
| Bottom side | 20 | QPSK | 50_0 | 18900/1880 | 1:1 | 0.566 | 0.06 | 19.55 | 23.00 | 2.213 | 1.253 | No |

# 6 SAR System Verification Procedure

## 6.1 Tissue Simulate Liquid

### 6.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

| Ingredients (% by weight) | Frequency (MHz) | | | | |
|---|---|---|---|---|---|
| | 450 | 700-900 | 1750-2000 | 2300-2500 | 2500-2700 |
| Water | 38.56 | 40.30 | 55.24 | 55.00 | 54.92 |
| Salt (NaCl) | 3.95 | 1.38 | 0.31 | 0.2 | 0.23 |
| Sucrose | 56.32 | 57.90 | 0 | 0 | 0 |
| HEC | 0.98 | 0.24 | 0 | 0 | 0 |
| Bactericide | 0.19 | 0.18 | 0 | 0 | 0 |
| Tween | 0 | 0 | 44.45 | 44.80 | 44.85 |

Salt: $99^{+}$% Pure Sodium Chloride
Sucrose: $98^{+}$% Pure Sucrose
Water: De-ionized, 16 $M\Omega^{+}$ resistivity
HEC: Hydroxyethyl Cellulose
Tween: Polyoxyethylene (20) sorbitan monolaurate

HSL5GHz is composed of the following ingredients：

Water：50-65%

Mineral oil：10-30%

Emulsifiers：8-25%

Sodium salt：0-1.5%

Table 3： Recipe of Tissue Simulate Liquid

### 6.1.2 Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

| Tissue Type | Measured Frequency（MHz） | Target Tissue (±5%) | | Measured Tissue | | Liquid Temp.(℃) | Measured Date |
|---|---|---|---|---|---|---|---|
| | | $\varepsilon_r$ | σ(S/m) | $\varepsilon_r$ | σ(S/m) | | |
| 835 Head | 835 | 41.5 (39.43~43.58) | 0.90 (0.86~0.95) | 41.776 | 0.938 | 22.1 | 2020/5/23 |
| 835 Head | 835 | 41.5 (39.43~43.58) | 0.90 (0.86~0.95) | 39.988 | 0.944 | 22.1 | 2020/5/24 |
| 1750 Head | 1750 | 40.1 (38.10~42.11) | 1.37 (1.30~1.44) | 40.271 | 1.309 | 22.2 | 2020/5/25 |
| 1900 Head | 1900 | 40.0 (38.00~42.00) | 1.40 (1.33~1.47) | 40.173 | 1.376 | 22.3 | 2020/5/27 |
| 2450 Head | 2450 | 39.20 (37.24~41.16) | 1.80 (1.71~1.89) | 39.409 | 1.803 | 22.0 | 2020/6/2 |
| 2600 Head | 2600 | 39.0 (37.05~40.95) | 1.96 (1.86~2.06) | 38.869 | 1.973 | 22.1 | 2020/5/30 |
| 5250Head | 5250 | 35.9 (34.11~37.70) | 4.71 (4.47~4.95) | 36.654 | 4.711 | 22.2 | 2020/6/3 |
| 5600 Head | 5600 | 35.5 (33.73~37.28) | 5.07 (4.82~5.32) | 35.786 | 5.093 | 22.2 | 2020/6/3 |
| 5750 Head | 5750 | 35.4 (33.63~37.17) | 5.22 (4.96~5.48) | 35.605 | 5.286 | 22.2 | 2020/6/3 |

Table 4： Measurement result of Tissue electric parameters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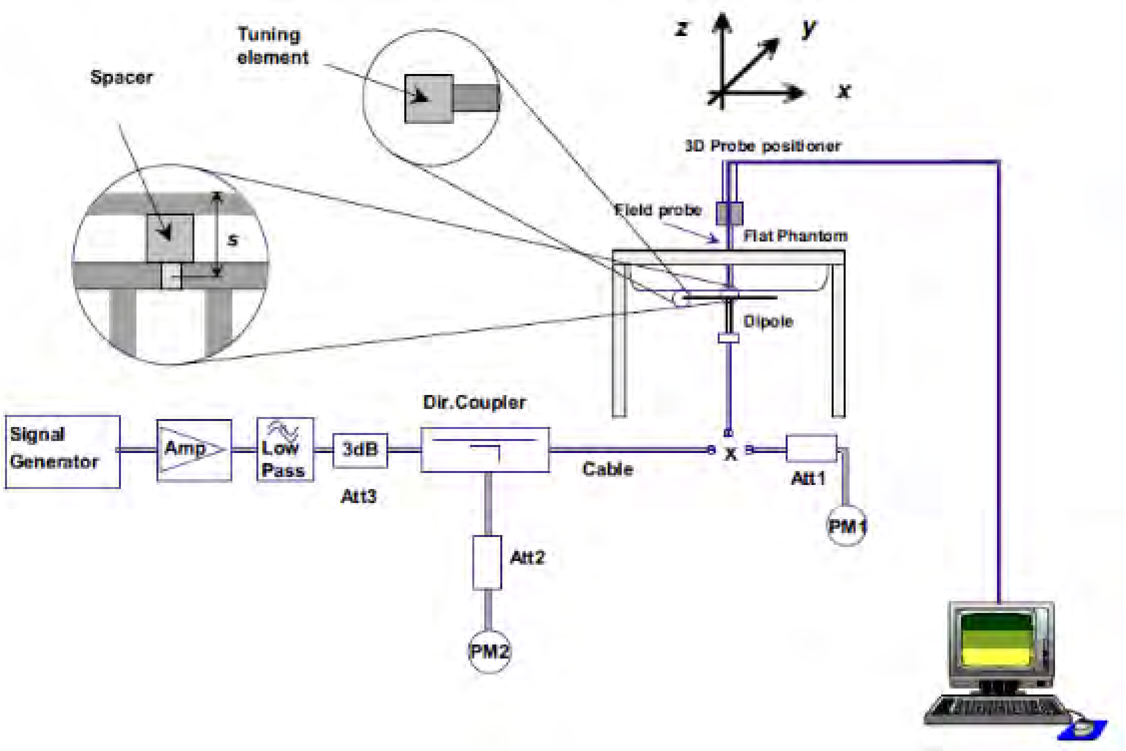
## 6.2 SAR System Check

The microwave circuit arrangement for system Check is sketched in F-12. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15±0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.




F-12. the microwave circuit arrangement used for SAR system check

### 6.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
a) There is no physical damage on the dipole;
b) System check with specific dipole is within 10% of calibrated value;
c) Return-loss is within 10% of calibrated measurement;
d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

### 6.2.2 Summary System Check Result(s)

| Validation Kit | | Measured SAR 250mW | Measured SAR 250mW | Measured SAR (normalized to 1W) | Measured SAR (normalized to 1W) | Target SAR (normalized to 1W) (±10%) | Target SAR (normalized to 1W) (±10%) | Liquid Temp. (℃) | Measured Date |
|---|---|---|---|---|---|---|---|---|---|
| | | 1g (W/kg) | 10g (W/kg) | 1g (W/kg) | 10g (W/kg) | 1-g(W/kg) | 10-g(W/kg) | | |
| D835V2 | Head | 2.62 | 1.71 | 10.48 | 6.84 | 9.64 (8.68~10.60) | 6.29 (5.66~6.92) | 22.1 | 2020/5/23 |
| D835V2 | Head | 2.63 | 1.72 | 10.52 | 6.88 | 9.64 (8.68~10.60) | 6.29 (5.66~6.92) | 22.1 | 2020/5/24 |
| D1750V2 | Head | 9.34 | 4.96 | 37.36 | 19.84 | 36.3 (32.67~39.93) | 19.2 (17.28~21.12) | 22.2 | 2020/5/25 |
| D1900V2 | Head | 10.30 | 5.27 | 41.20 | 21.08 | 39.3 (35.37~43.23) | 20.2 (18.18~22.22) | 22.3 | 2020/5/27 |
| D2450V2 | Head | 13.50 | 6.11 | 54.00 | 24.44 | 51.9 (46.71~57.09) | 23.8 (21.42~26.18) | 22.0 | 2020/6/2 |
| D2600V2 | Head | 14.10 | 6.28 | 56.40 | 25.12 | 56.8 (51.12~62.48) | 24.9 (22.41~27.39) | 22.1 | 2020/5/30 |
| Validation Kit | | Measured SAR 100mW | Measured SAR 100mW | Measured SAR (normalized to 1W) | Measured SAR (normalized to 1W) | Target SAR (normalized to 1W) (±10%) | Target SAR (normalized to 1W) (±10%) | Liquid Temp. (℃) | Measured Date |
| | | 1g (W/kg) | 10g (W/kg) | 1g (W/kg) | 10g (W/kg) | 1-g(W/kg) | 10-g(W/kg) | | |
| D5GHzV2 | Head (5.25GHz) | 7.93 | 2.27 | 79.30 | 22.70 | 75.2 (67.68~82.72) | 21.5 (19.35~23.65) | 22.2 | 2020/6/3 |
| | Head (5.6GHz) | 8.44 | 2.40 | 84.40 | 24.00 | 80 (72~88) | 22.7 (20.43~24.97) | 22.2 | 2020/6/3 |
| | Head (5.75GHz) | 7.84 | 2.21 | 78.40 | 22.10 | 78.7 (70.83~86.57) | 22.3 (20.07~24.53) | 22.2 | 2020/6/3 |

Table 5： SAR System Check Result

### 6.2.3 Detailed System Check Results

Please see the Appendix A

# 7 Test Configuration

## 7.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

## 7.2 Operation Configurations

### 7.2.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 33 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 33 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode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### 7.2.2 WCDMA Test Configuration

**1）. Output Power Verification**

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1's" for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

**2）. Head SAR**

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure

**3）. Body SAR**

SAR for body configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

**4）. HSDPA / HSUPA / DC-HSDPA**

According to KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA

**a) HSDPA**

HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms and a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors($\beta c$, $\beta d$), and HS-DPCCH power offset parameters ($\Delta ACK$, $\Delta NACK$, $\Delta CQI$) are set according to values indicated in the following table The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

| Sub-test | βc | Bd | βd(SF) | βc/βd | βhs | CM(dB) | MPR (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0 |
| 2 | 12/15(3) | 15/15(3) | 64 | 12/15(3) | 24/15 | 1.0 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

Note1: △ACK, △NACK and △CQI= 8 Ahs = βhs/βc=30/15 βhs=30/15*βc
Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, △ACK and △NACK= 8 ( Ahs=30/15) with βhs=30/15*βc,and △CQI= 7 ( Ahs=24/15) with βhs=24/15*βc.
Note3: CM=1 forβc/βd =12/15, βhs/βc=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

| Parameter | Value |
|---|---|
| **Nominal average inf. bit rate** | 534 kbit/s |
| **Inter-TTI Distance** | 3 TTI"s |
| **Number of HARQ Processes** | 2 Processes |
| **Information Bit Payload** | 3202 Bits |
| **MAC-d PDU size** | 336 Bits |
| **Number Code Blocks** | 1 Block |
| **Binary Channel Bits Per TTI** | 4800 Bits |
| **Total Available SMLs in UE** | 19200 SMLs |
| **Number of SMLs per HARQ Process** | 9600 SMLs |
| **Coding Rate** | 0.67 |
| **Number of Physical Channel Codes** | 5 |

Table 6： settings of required H-Set 1 QPSK acc. to 3GPP 34.121

| HS-DSCH Category | Maximum HS-DSCH Codes Received | Minimum Inter-TTI Interval | MaximumH S-DSCH Transport BlockBits/HS-DSCH TTI | Total Soft Channel Bits |
|---|---|---|---|---|
| 1 | 5 | 3 | 7298 | 19200 |
| 2 | 5 | 3 | 7298 | 28800 |
| 3 | 5 | 2 | 7298 | 28800 |
| 4 | 5 | 2 | 7298 | 38400 |
| 5 | 5 | 1 | 7298 | 57600 |
| 6 | 5 | 1 | 7298 | 67200 |
| 7 | 10 | 1 | 14411 | 115200 |
| 8 | 10 | 1 | 14411 | 134400 |
| 9 | 15 | 1 | 25251 | 172800 |
| 10 | 15 | 1 | 27952 | 172800 |
| 11 | 5 | 2 | 3630 | 14400 |
| 12 | 5 | 1 | 3630 | 28800 |
| 13 | 15 | 1 | 34800 | 259200 |
| 14 | 15 | 1 | 42196 | 259200 |
| 15 | 15 | 1 | 23370 | 345600 |
| 16 | 15 | 1 | 27952 | 345600 |

Table 7： HSDPA UE category

**b) HSUPA**

Due to inner loop power control requirements in HSUPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSUPA should be configured according to the values indicated below as well as other applicable procedures described in the „WCDMA Handset" and „Release 5 HSUPA Data Device" sections of 3G device.

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ (1) | $\beta_{ec}$ | $\beta_{ed}$ | $\beta_{ec}$ (SF) | $\beta_{ed}$ (code) | CM (2) (dB) | MPR (dB) | AG (4) Index | E-TFCI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11/15 (3) | 15/15 (3) | 64 | 11/15 (3) | 22/15 | 209/225 | 1039/225 | 4 | 1 | 1.0 | 0.0 | 20 | 75 |
| 2 | 6/15 | 15/15 | 64 | 6/15 | 12/15 | 12/15 | 94/75 | 4 | 1 | 3.0 | 2.0 | 12 | 67 |
| 3 | 15/15 | 9/15 | 64 | 15/9 | 30/15 | 30/15 | $\beta_{ed1}$:47/15<br>$\beta_{ed2}$:47/15 | 4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15 (4) | 15/15 (4) | 64 | 15/15 (4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

Note 1: $\Delta$ ACK, $\Delta$ NACK and $\Delta$ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference

Note 3 : For subtest 1 the $\beta_c/\beta_d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$

Note 4 : For subtest 5 the $\beta_c/\beta_d$ ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$

Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g

Note 6: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Table 8: Subtests for UMTS Release 6 HSUPA

| UE E-DCH Category | Maximum E-DCH Codes Transmitted | Number of HARQ Processes | E-DCH TTI(ms) | Minimum Speading Factor | Maximum E-DCH Transport Block Bits | Max Rate (Mbps) |
|---|---|---|---|---|---|---|
| 1 | 1 | 4 | 10 | 4 | 7110 | 0.7296 |
| 2 | 2 | 8 | 2 | 4 | 2798 | 1.4592 |
| | 2 | 4 | 10 | 4 | 14484 | |
| 3 | 2 | 4 | 10 | 4 | 14484 | 1.4592 |
| 4 | 2 | 8 | 2 | 2 | 5772 | 2.9185 |
| | 2 | 4 | 10 | 2 | 20000 | 2.00 |
| 5 | 2 | 4 | 10 | 2 | 20000 | 2.00 |
| 6 (No DPDCH) | 4 | 8 | 10 | 2SF2&2SF4 | 11484 | 5.76 |
| | 4 | 4 | 2 | | 20000 | 2.00 |
| 7 (No DPDCH) | 4 | 8 | 2 | 2SF2&2SF4 | 22996 | ? |
| | 4 | 4 | 10 | | 20000 | ? |

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).

Table 9: HSUPA UE category

c) **DC-HSDPA**

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a Second serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.
The following tests were completed according to procedures in section 7.3.13 of 3GPP TS 34.108 v9.5.0.
A summary of these settings are illustrated below:
Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

**Table E.5.0: Levels for HSDPA connection setup**

| Parameter During Connection setup | Unit | Value |
|---|---|---|
| P-CPICH_Ec/Ior | dB | -10 |
| P-CCPCH and SCH_Ec/Ior | dB | -12 |
| PICH _Ec/Ior | dB | -15 |
| HS-PDSCH | dB | off |
| HS-SCCH_1 | dB | off |
| DPCH_Ec/Ior | dB | -5 |
| OCNS_Ec/Ior | dB | -3.1 |

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13.
The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.
The measurements were performed with a Fixed Reference Channel (FRC) H-Set 12 with QPSK.

| Parameter | Value |
|---|---|
| Nominal average inf. bit rate | 60 kbit/s |
| Inter-TTI Distance | 1 TTI's |
| Number of HARQ Processes | 6 Processes |
| Information Bit Payload | 120 Bits |
| Number Code Blocks | 1 Block |
| Binary Channel Bits Per TTI | 960 Bits |
| Total Available SMLs in UE | 19200 SMLs |
| Number of SMLs per HARQ Process | 3200 SMLs |
| Coding Rate | 0.15 |
| Number of Physical Channel Codes | 1 |

Table 10： settings of required H-Set 12 QPSK acc. to 3GPP 34.121

Note:
1. The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table above.
2. Maximum number of transmission is limited to 1,i.e.,retransmission is not allowed. The redundancy and constellation version 0 shall be used.

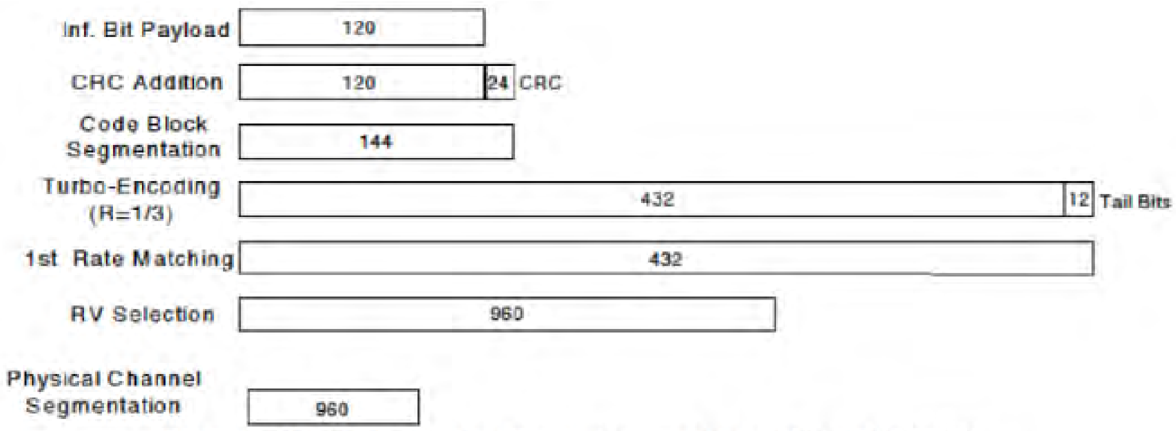



**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 5 procedures. A summary of subtest settings are illustrated below:

| Sub-test | $\beta_c$ | $\beta_d$ | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{hs}$ (1) | CM(dB)(2) | MPR (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0 |
| 2 | 12/15(3) | 15/15(3) | 64 | 12/15(3) | 24/15 | 1.0 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |
| Note 1: Δ ACK, Δ NACK and Δ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$<br>Note 2: CM=1 for $\beta_c/\beta_d$= 12/15, $\beta_{hs}/\beta_c$=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.<br>Note 3: For subtest 2 the $\beta_c/\beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c$ = 11/15 and $\beta_d$ = 15/15 | | | | | | | |

Up commands are set continuously to set the UE to Max power.
Note:
1. The Dual Carriers transmission only applies to HSDPA physical channels
2. The Dual Carriers belong to the same Node and are on adjacent carriers.
3. The Dual Carriers do not support MIMO to serve UEs configured for dual cell operation
4. The Dual Carriers operate in the same frequency band.
5. The device doesn't support the modulation of 16QAM in uplink but 64QAM in downlink for DC-HSDPA mode.
6. The device doesn't support carrier aggregation for it just can operate in Release 8.

**d) <u>HSPA+</u>**

Per KDB941225D01, SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode. Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

- **Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM**

| Sub-test | $\beta_c$ (Note3) | $\beta_d$ | $\beta_{HS}$ (Note1) | $\beta_{ec}$ | $\beta_{ed}$ (2xSF2) (Note 4) | $\beta_{ed}$ (2xSF4) (Note 4) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 4) | E-TFCI (Note 5) | E-TFCI (boost) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 30/15 | 30/15 | $\beta_{ed}$1: 30/15<br>$\beta_{ed}$2: 30/15 | $\beta_{ed}$3: 24/15<br>$\beta_{ed}$4: 24/15 | 3.5 | 2.5 | 14 | 105 | 105 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ .

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the $\beta_c$ is set to 1 and $\beta_d$ = 0 by default.

Note 4: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

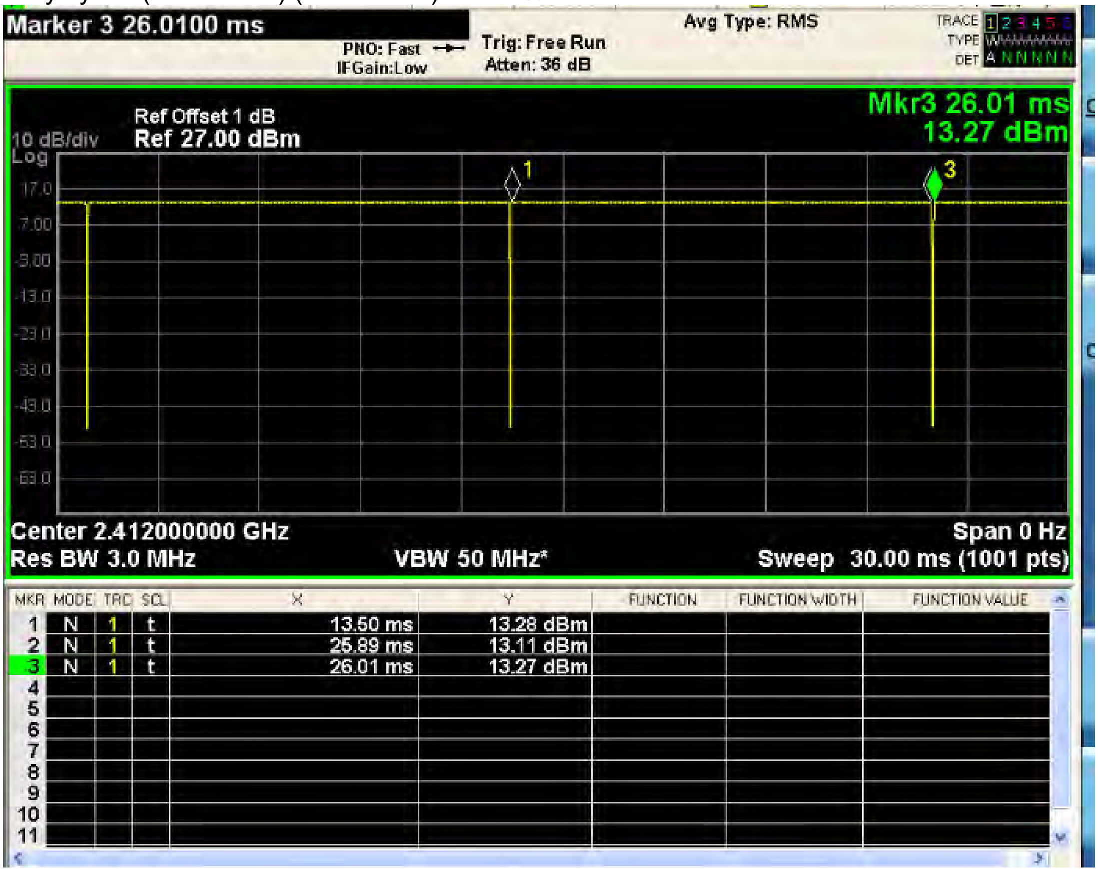
### 7.2.3 WiFi Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

#### 7.2.3.1 Duty cycle

1) Wi-Fi 2.4GHz Ant8(Chain0) 802.11b:

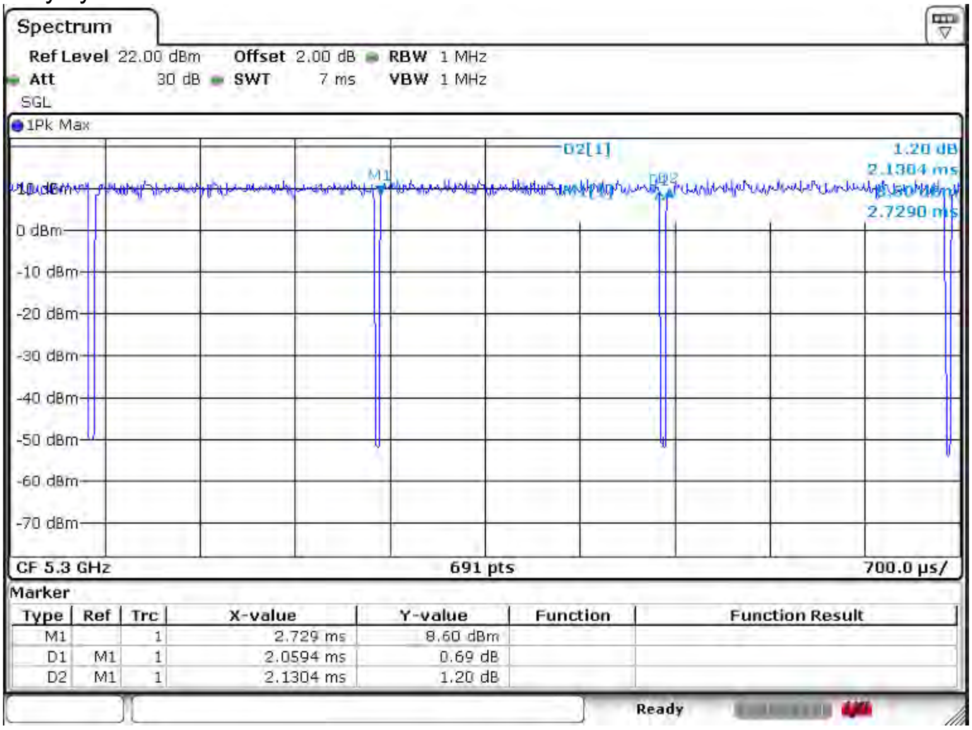
Duty cycle=(25.89-13.5)/(26.01-13.5)=99.04%



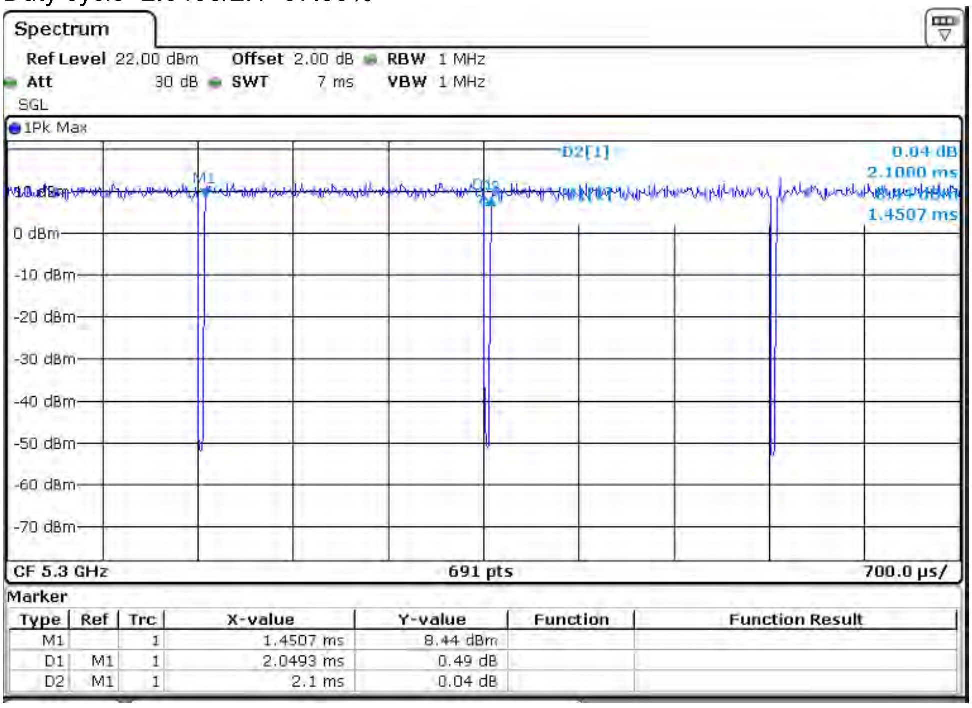
2) Wi-Fi 2.4GHz MIMO 802.11b:

Duty cycle=(15.48-3.103)/(15.66-3.103)=98.57%

3) Wi-Fi 5GHz Ant7(Chain1) 802.11a:
Duty cycle=2.0594/2.1304=96.67%




4) Wi-Fi 5GHz MIMO 802.11a:
Duty cycle=2.0493/2.1=97.59%



#### 7.2.3.2 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

1）. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).
2）. When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.
3）. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

#### 7.2.3.3 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration.
For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.
When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

#### 7.2.3.4 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following:

1）. When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.

2）. When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

3）. The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.

   a) SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.
   b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the *reported* SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.

4）. SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

   a) replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)
   b) replace “initial test configuration” with “all tested higher output power configurations”

#### 7.2.3.5 2.4 GHz WiFi SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

- **802.11b DSSS SAR Test Requirements**

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1）. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2）. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

- **2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.

1）. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

2）. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

#### 7.2.3.6 5 GHz WiFi SAR Procedures

- **U-NII-1 and U-NII-2A Bands**
  For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following：

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

- **U-NII-2C and U-NII-3 Bands**
  The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.

  When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.



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- **OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements**
  The initial test configuration for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.
  1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
  2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
  3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
  4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
     After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.
     a) The channel closest to mid-band frequency is selected for SAR measurement.
     b) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 a/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

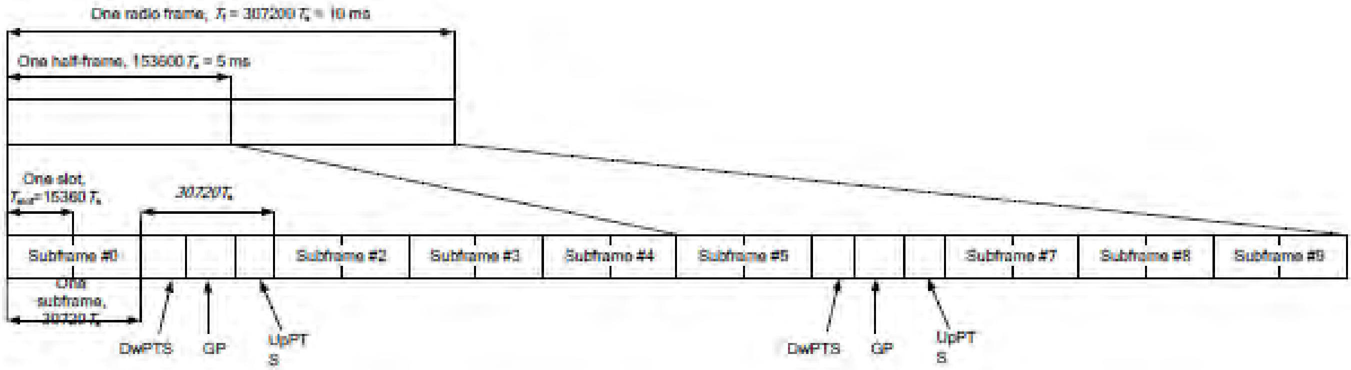
### 7.2.4 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The Anritsu MT8821C was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

**TDD LTE test consideration**

For Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.
SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.
LTE TDD Band support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Frame structure type 2:



Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

| Special subframe configuration | Normal cyclic prefix in downlink | | | Extended cyclic prefix in downlink | | |
|---|---|---|---|---|---|---|
| | DwPTS | UpPTS | | DwPTS | UpPTS | |
| | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink | | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink |
| 0 | 6592.Ts | 2192.Ts | 2560.Ts | 7680.Ts | 2192.Ts | 2560.Ts |
| 1 | 19760.Ts | | | 20480.Ts | | |
| 2 | 21952.Ts | | | 23040.Ts | | |
| 3 | 24144.Ts | | | 25600.Ts | | |
| 4 | 26336.Ts | | | 7680.Ts | 4384.Ts | 5120.Ts |
| 5 | 6592.Ts | 4384.Ts | 5120.Ts | 20480.Ts | | |
| 6 | 19760.Ts | | | 23040.Ts | | |
| 7 | 21952.Ts | | | 25600.Ts | | |
| 8 | 24144.Ts | | | - | - | - |
| 9 | 13168.Ts | | | - | - | - |

Uplink-downlink configurations.

| Uplink-downlink configuration | Downlink-to-Uplink Switch-point periodicity | Subframe number | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 5 ms | D | S | U | U | U | D | S | U | U | U |
| 1 | 5 ms | D | S | U | U | D | D | S | U | U | D |
| 2 | 5 ms | D | S | U | D | D | D | S | U | D | D |
| 3 | 10 ms | D | S | U | U | U | D | D | D | D | D |
| 4 | 10 ms | D | S | U | U | D | D | D | D | D | D |
| 5 | 10 ms | D | S | U | D | D | D | D | D | D | D |
| 6 | 5 ms | D | S | U | U | U | D | S | U | U | D |

**Calculated Duty Cycle=[Extended cyclic prefix in uplink x (Ts) x # of S + # of U]/10ms**

| Uplink-Downlink Configuration | Downlink-to-Uplink Switch-point Periodicity | Subframe Number | | | | | | | | | | Calculated Duty Cycle (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 0 | 5 ms | D | S | U | U | U | D | S | U | U | U | 63.33 |
| 1 | 5 ms | D | S | U | U | D | D | S | U | U | D | 43.33 |
| 2 | 5 ms | D | S | U | D | D | D | S | U | D | D | 23.33 |
| 3 | 10 ms | D | S | U | U | U | D | D | D | D | D | 31.67 |
| 4 | 10 ms | D | S | U | U | D | D | D | D | D | D | 21.67 |
| 5 | 10 ms | D | S | U | D | D | D | D | D | D | D | 11.67 |
| 6 | 5 ms | D | S | U | U | U | D | S | U | U | D | 53.33 |

**A) Spectrum Plots for RB Configurations**
A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.
**B) MPR**
MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

| Modulation | Channel bandwidth / Transmission bandwidth ($N_{RB}$) | | | | | | MPR (dB) |
|---|---|---|---|---|---|---|---|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | |
| QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 |
| 64 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 2 |
| 64 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 3 |

**C) A-MPR**
A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.
**D) Largest channel bandwidth standalone SAR test requirements**
1) QPSK with 1 RB allocation
Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4) Higher order modulations
For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.
**E) Other channel bandwidth standalone SAR test requirements**
For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

# 8 Test Result

## 8.1 Measurement of RF conducted Power

### 8.1.1 Conducted Power of Main Antenna(Ant1)

#### 8.1.1.1 Conducted Power of GSM

| GSM 850 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 128 | 190 | 251 | | | 128 | 190 | 251 | |
| GSM(GMSK) | GSM | 31.77 | 31.72 | 31.66 | 32.50 | -9.19 | 22.58 | 22.53 | 22.47 | 23.31 |
| GPRS/ EGPRS (GMSK) | 1 TX Slot | 31.71 | 31.64 | 31.65 | 32.50 | -9.19 | 22.52 | 22.45 | 22.46 | 23.31 |
| | 2 TX Slots | 28.65 | 28.67 | 28.70 | 29.50 | -6.18 | 22.47 | 22.49 | 22.52 | 23.32 |
| | 3 TX Slots | 26.65 | 26.59 | 26.62 | 27.70 | -4.42 | 22.23 | 22.17 | 22.20 | 23.28 |
| | 4 TX Slots | 25.09 | 25.18 | 25.13 | 26.50 | -3.17 | 21.92 | 22.01 | 21.96 | **23.33** |
| EGPRS (8PSK) | 1 TX Slot | 25.56 | 25.55 | 25.60 | 27.00 | -9.19 | 16.37 | 16.36 | 16.41 | 17.81 |
| | 2 TX Slots | 22.79 | 22.79 | 22.85 | 24.00 | -6.18 | 16.61 | 16.61 | 16.67 | 17.82 |
| | 3 TX Slots | 20.82 | 20.79 | 20.73 | 22.20 | -4.42 | 16.40 | 16.37 | 16.31 | 17.78 |
| | 4 TX Slots | 19.35 | 19.37 | 19.42 | 21.00 | -3.17 | 16.18 | 16.20 | 16.25 | 17.83 |

Table 11：Conducted Power of GSM

Note:

1）. CMW500 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

| No. of timeslots | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Duty Cycle | 1:8.3 | 1:4.15 | 1:2.77 | 1:2.075 |
| Time based avg. power compared to slotted avg. power | -9.19 | -6.18 | -4.42 | -3.17 |

2）. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

3）. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used

### 8.1.1.2 Conducted Power of WCDMA

| WCDMA Band V | | | | | |
|---|---|---|---|---|---|
| Average Conducted Power(dBm) | | | | | |
| Channel | | 4132 | 4182 | 4233 | Tune up |
| WCDMA | 12.2kbps RMC | 22.96 | 22.94 | 22.96 | 24.00 |
| | 12.2kbps AMR | 22.86 | 22.91 | 22.94 | 24.00 |
| HSDPA | Subtest 1 | 21.93 | 21.98 | 21.96 | 23.00 |
| | Subtest 2 | 21.80 | 21.94 | 21.96 | 23.00 |
| | Subtest 3 | 21.48 | 21.42 | 21.50 | 22.50 |
| | Subtest 4 | 21.33 | 21.37 | 21.43 | 22.50 |
| HSUPA | Subtest 1 | 21.99 | 21.96 | 21.94 | 23.00 |
| | Subtest 2 | 19.95 | 19.92 | 19.92 | 21.00 |
| | Subtest 3 | 20.98 | 20.89 | 20.95 | 22.00 |
| | Subtest 4 | 19.90 | 19.92 | 19.96 | 21.00 |
| | Subtest 5 | 21.90 | 21.90 | 21.95 | 23.00 |
| DC-HSDPA | Subtest 1 | 21.91 | 21.94 | 21.97 | 23.00 |
| | Subtest 2 | 21.85 | 21.93 | 21.99 | 23.00 |
| | Subtest 3 | 21.53 | 21.44 | 21.50 | 22.50 |
| | Subtest 4 | 21.32 | 21.34 | 21.44 | 22.50 |
| HSPA+ | 16QAM | 20.37 | 20.43 | 20.42 | 21.50 |

Table 12：Conducted Power of WCDMA

Note:

1) when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

### 8.1.1.3 Conducted Power of LTE

| LTE Band 5 | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20407 | Channel 20525 | Channel 20643 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.28 | 22.13 | 22.01 | 23.50 |
| | | 1 | 2 | 22.33 | 22.19 | 22.11 | 23.50 |
| | | 1 | 5 | 22.23 | 22.12 | 21.95 | 23.50 |
| | | 3 | 0 | 22.29 | 22.20 | 21.94 | 23.50 |
| | | 3 | 2 | 22.31 | 22.23 | 22.05 | 23.50 |
| | | 3 | 3 | 22.31 | 22.16 | 22.02 | 23.50 |
| | | 6 | 0 | 21.36 | 21.12 | 21.10 | 22.50 |
| | 16QAM | 1 | 0 | 21.86 | 21.61 | 21.31 | 22.50 |
| | | 1 | 2 | 21.60 | 21.15 | 21.33 | 22.50 |
| | | 1 | 5 | 21.56 | 21.56 | 21.29 | 22.50 |
| | | 3 | 0 | 21.49 | 21.29 | 21.13 | 22.50 |
| | | 3 | 2 | 21.40 | 20.99 | 21.24 | 22.50 |
| | | 3 | 3 | 21.24 | 21.16 | 20.96 | 22.50 |
| | | 6 | 0 | 20.53 | 20.38 | 20.25 | 21.50 |
| | 64QAM | 1 | 0 | 20.83 | 20.60 | 20.31 | 21.50 |
| | | 1 | 2 | 20.60 | 20.16 | 20.35 | 21.50 |
| | | 1 | 5 | 20.57 | 20.53 | 20.29 | 21.50 |
| | | 3 | 0 | 20.54 | 20.26 | 20.17 | 21.50 |
| | | 3 | 2 | 20.40 | 19.98 | 20.20 | 21.50 |
| | | 3 | 3 | 20.20 | 20.20 | 20.00 | 21.50 |
| | | 6 | 0 | 19.59 | 19.42 | 19.21 | 20.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20415 | Channel 20525 | Channel 20635 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.09 | 21.85 | 22.13 | 23.50 |
| | | 1 | 7 | 22.22 | 22.27 | 22.18 | 23.50 |
| | | 1 | 14 | 22.10 | 21.96 | 22.08 | 23.50 |
| | | 8 | 0 | 21.19 | 21.15 | 21.10 | 22.50 |
| | | 8 | 4 | 21.27 | 21.23 | 21.34 | 22.50 |
| | | 8 | 7 | 21.18 | 21.16 | 21.13 | 22.50 |
| | | 15 | 0 | 21.20 | 21.19 | 21.20 | 22.50 |
| | 16QAM | 1 | 0 | 21.63 | 21.75 | 21.40 | 22.50 |
| | | 1 | 7 | 21.61 | 21.49 | 21.50 | 22.50 |
| | | 1 | 14 | 21.51 | 21.78 | 21.00 | 22.50 |
| | | 8 | 0 | 20.18 | 20.02 | 20.13 | 21.50 |
| | | 8 | 4 | 20.25 | 20.14 | 20.21 | 21.50 |
| | | 8 | 7 | 20.23 | 20.28 | 20.18 | 21.50 |
| | | 15 | 0 | 20.09 | 20.20 | 20.14 | 21.50 |
| | 64QAM | 1 | 0 | 20.62 | 20.71 | 20.42 | 21.50 |
| | | 1 | 7 | 20.64 | 20.54 | 20.54 | 21.50 |
| | | 1 | 14 | 20.53 | 20.82 | 20.02 | 21.50 |
| | | 8 | 0 | 19.18 | 19.00 | 19.11 | 20.50 |
| | | 8 | 4 | 19.24 | 19.18 | 19.23 | 20.50 |
| | | 8 | 7 | 19.22 | 19.27 | 19.17 | 20.50 |
| | | 15 | 0 | 19.10 | 19.20 | 19.13 | 20.50 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 20425 | Channel 20525 | Channel 20625 | Tune up |
|---|---|---|---|---|---|---|---|
| **5MHz** | QPSK | 1 | 0 | 22.27 | 22.16 | 22.00 | 23.50 |
| | | 1 | 13 | 22.34 | 22.38 | 22.18 | 23.50 |
| | | 1 | 24 | 22.35 | 22.28 | 22.02 | 23.50 |
| | | 12 | 0 | 21.35 | 21.34 | 21.14 | 22.50 |
| | | 12 | 6 | 21.47 | 21.40 | 21.22 | 22.50 |
| | | 12 | 13 | 21.43 | 21.32 | 21.19 | 22.50 |
| | | 25 | 0 | 21.48 | 21.39 | 21.11 | 22.50 |
| | 16QAM | 1 | 0 | 21.46 | 21.73 | 21.57 | 22.50 |
| | | 1 | 13 | 21.53 | 21.49 | 21.30 | 22.50 |
| | | 1 | 24 | 21.38 | 21.38 | 21.11 | 22.50 |
| | | 12 | 0 | 20.41 | 20.37 | 20.10 | 21.50 |
| | | 12 | 6 | 20.39 | 20.36 | 20.19 | 21.50 |
| | | 12 | 13 | 20.38 | 20.34 | 20.26 | 21.50 |
| | | 25 | 0 | 20.47 | 20.37 | 20.20 | 21.50 |
| | 64QAM | 1 | 0 | 20.46 | 20.72 | 20.56 | 21.50 |
| | | 1 | 13 | 20.56 | 20.45 | 20.32 | 21.50 |
| | | 1 | 24 | 20.43 | 20.37 | 20.10 | 21.50 |
| | | 12 | 0 | 19.41 | 19.40 | 19.10 | 20.50 |
| | | 12 | 6 | 19.43 | 19.39 | 19.18 | 20.50 |
| | | 12 | 13 | 19.43 | 19.35 | 19.30 | 20.50 |
| | | 25 | 0 | 19.52 | 19.35 | 19.16 | 20.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20450 | Channel 20525 | Channel 20600 | Tune up |
| **10MHz** | QPSK | 1 | 0 | **22.49** | 22.38 | 22.24 | 23.50 |
| | | 1 | 25 | 22.18 | 22.24 | 22.23 | 23.50 |
| | | 1 | 49 | 22.30 | 21.99 | 22.00 | 23.50 |
| | | 25 | 0 | **21.47** | 21.27 | 21.19 | 22.50 |
| | | 25 | 13 | 21.40 | 21.36 | 21.17 | 22.50 |
| | | 25 | 25 | 21.41 | 21.23 | 21.24 | 22.50 |
| | | 50 | 0 | 21.30 | 21.33 | 21.17 | 22.50 |
| | 16QAM | 1 | 0 | 21.33 | 21.70 | 21.56 | 22.50 |
| | | 1 | 25 | 21.22 | 21.77 | 21.49 | 22.50 |
| | | 1 | 49 | 21.35 | 21.43 | 21.24 | 22.50 |
| | | 25 | 0 | 20.40 | 20.22 | 20.23 | 21.50 |
| | | 25 | 13 | 20.38 | 20.29 | 20.31 | 21.50 |
| | | 25 | 25 | 20.52 | 20.32 | 20.13 | 21.50 |
| | | 50 | 0 | 20.31 | 20.22 | 20.13 | 21.50 |
| | 64QAM | 1 | 0 | 20.32 | 20.67 | 20.56 | 21.50 |
| | | 1 | 25 | 20.18 | 20.83 | 20.46 | 21.50 |
| | | 1 | 49 | 20.32 | 20.40 | 20.28 | 21.50 |
| | | 25 | 0 | 19.39 | 19.21 | 19.26 | 20.50 |
| | | 25 | 13 | 19.34 | 19.32 | 19.30 | 20.50 |
| | | 25 | 25 | 19.57 | 19.33 | 19.09 | 20.50 |
| | | 50 | 0 | 19.34 | 19.28 | 19.16 | 20.50 |

| LTE Band 26 | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26697 | Channel 26865 | Channel 27033 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.73 | 22.58 | 22.47 | 24.00 |
| | | 1 | 2 | 22.85 | 22.72 | 22.55 | 24.00 |
| | | 1 | 5 | 22.75 | 22.60 | 22.47 | 24.00 |
| | | 3 | 0 | 22.79 | 22.56 | 22.53 | 24.00 |
| | | 3 | 2 | 22.85 | 22.65 | 22.59 | 24.00 |
| | | 3 | 3 | 22.80 | 22.69 | 22.57 | 24.00 |
| | | 6 | 0 | 21.84 | 21.70 | 21.63 | 23.00 |
| | 16QAM | 1 | 0 | 22.27 | 22.13 | 22.10 | 23.00 |
| | | 1 | 2 | 21.99 | 22.23 | 21.98 | 23.00 |
| | | 1 | 5 | 22.37 | 22.23 | 21.54 | 23.00 |
| | | 3 | 0 | 21.89 | 21.77 | 21.64 | 23.00 |
| | | 3 | 2 | 21.94 | 21.79 | 21.72 | 23.00 |
| | | 3 | 3 | 21.84 | 21.77 | 21.61 | 23.00 |
| | | 6 | 0 | 20.93 | 20.77 | 20.68 | 22.00 |
| | 64QAM | 1 | 0 | 21.18 | 21.03 | 21.00 | 22.00 |
| | | 1 | 2 | 20.89 | 21.16 | 20.90 | 22.00 |
| | | 1 | 5 | 21.28 | 21.17 | 20.49 | 22.00 |
| | | 3 | 0 | 20.79 | 20.67 | 20.57 | 22.00 |
| | | 3 | 2 | 20.83 | 20.71 | 20.66 | 22.00 |
| | | 3 | 3 | 20.76 | 20.69 | 20.56 | 22.00 |
| | | 6 | 0 | 19.86 | 19.71 | 19.61 | 21.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26705 | Channel 26865 | Channel 27025 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.72 | 22.58 | 22.58 | 24.00 |
| | | 1 | 7 | 22.88 | 22.65 | 22.57 | 24.00 |
| | | 1 | 14 | 22.83 | 22.66 | 22.58 | 24.00 |
| | | 8 | 0 | 21.86 | 21.77 | 21.69 | 23.00 |
| | | 8 | 4 | 21.93 | 21.78 | 21.70 | 23.00 |
| | | 8 | 7 | 21.88 | 21.77 | 21.73 | 23.00 |
| | | 15 | 0 | 21.94 | 21.79 | 21.67 | 23.00 |
| | 16QAM | 1 | 0 | 22.07 | 21.92 | 21.90 | 23.00 |
| | | 1 | 7 | 22.15 | 21.98 | 21.78 | 23.00 |
| | | 1 | 14 | 22.15 | 22.13 | 21.89 | 23.00 |
| | | 8 | 0 | 21.01 | 20.78 | 20.64 | 22.00 |
| | | 8 | 4 | 21.05 | 20.88 | 20.69 | 22.00 |
| | | 8 | 7 | 21.01 | 20.77 | 20.70 | 22.00 |
| | | 15 | 0 | 21.01 | 20.72 | 20.70 | 22.00 |
| | 64QAM | 1 | 0 | 20.99 | 20.82 | 20.85 | 22.00 |
| | | 1 | 7 | 21.05 | 20.88 | 20.70 | 22.00 |
| | | 1 | 14 | 21.07 | 21.07 | 20.78 | 22.00 |
| | | 8 | 0 | 19.96 | 19.69 | 19.58 | 21.00 |
| | | 8 | 4 | 19.98 | 19.79 | 19.60 | 21.00 |
| | | 8 | 7 | 19.96 | 19.69 | 19.60 | 21.00 |
| | | 15 | 0 | 19.96 | 19.65 | 19.61 | 21.00 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 26715 | Channel 26865 | Channel 27015 | Tune up |
|---|---|---|---|---|---|---|---|
| **5MHz** | QPSK | 1 | 0 | 22.84 | 22.69 | 22.60 | 24.00 |
| | | 1 | 13 | 22.80 | 22.72 | 22.77 | 24.00 |
| | | 1 | 24 | 22.82 | 22.81 | 22.80 | 24.00 |
| | | 12 | 0 | 21.93 | 21.71 | 21.65 | 23.00 |
| | | 12 | 6 | 21.98 | 21.80 | 21.83 | 23.00 |
| | | 12 | 13 | 21.87 | 21.80 | 21.76 | 23.00 |
| | | 25 | 0 | 21.91 | 21.82 | 21.62 | 23.00 |
| | 16QAM | 1 | 0 | 21.72 | 21.74 | 21.74 | 23.00 |
| | | 1 | 13 | 21.85 | 21.77 | 21.65 | 23.00 |
| | | 1 | 24 | 21.90 | 21.95 | 21.61 | 23.00 |
| | | 12 | 0 | 20.93 | 20.77 | 20.72 | 22.00 |
| | | 12 | 6 | 20.93 | 20.81 | 20.83 | 22.00 |
| | | 12 | 13 | 20.93 | 20.89 | 20.79 | 22.00 |
| | | 25 | 0 | 20.91 | 20.78 | 20.74 | 22.00 |
| | 64QAM | 1 | 0 | 20.65 | 20.67 | 20.69 | 22.00 |
| | | 1 | 13 | 20.76 | 20.70 | 20.60 | 22.00 |
| | | 1 | 24 | 20.83 | 20.88 | 20.50 | 22.00 |
| | | 12 | 0 | 19.82 | 19.69 | 19.65 | 21.00 |
| | | 12 | 6 | 19.84 | 19.72 | 19.73 | 21.00 |
| | | 12 | 13 | 19.84 | 19.79 | 19.70 | 21.00 |
| | | 25 | 0 | 19.86 | 19.69 | 19.66 | 21.00 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 26740 | Channel 26865 | Channel 26990 | Tune up |
|---|---|---|---|---|---|---|---|
| **10MHz** | QPSK | 1 | 0 | 22.68 | 22.74 | 22.75 | 24.00 |
| | | 1 | 25 | 22.68 | 22.61 | 22.53 | 24.00 |
| | | 1 | 49 | 22.73 | 22.69 | 22.45 | 24.00 |
| | | 25 | 0 | 21.75 | 21.59 | 21.67 | 23.00 |
| | | 25 | 13 | 21.85 | 21.86 | 21.84 | 23.00 |
| | | 25 | 25 | 21.70 | 21.82 | 21.75 | 23.00 |
| | | 50 | 0 | 21.75 | 21.76 | 21.60 | 23.00 |
| | 16QAM | 1 | 0 | 22.38 | 21.92 | 21.99 | 23.00 |
| | | 1 | 25 | 22.24 | 21.89 | 21.89 | 23.00 |
| | | 1 | 49 | 22.25 | 22.38 | 21.82 | 23.00 |
| | | 25 | 0 | 20.77 | 20.67 | 20.59 | 22.00 |
| | | 25 | 13 | 20.98 | 20.78 | 20.75 | 22.00 |
| | | 25 | 25 | 20.73 | 20.75 | 20.49 | 22.00 |
| | | 50 | 0 | 20.71 | 20.67 | 20.64 | 22.00 |
| | 64QAM | 1 | 0 | 21.31 | 20.81 | 20.91 | 22.00 |
| | | 1 | 25 | 21.18 | 20.83 | 20.80 | 22.00 |
| | | 1 | 49 | 21.18 | 21.28 | 20.71 | 22.00 |
| | | 25 | 0 | 19.70 | 19.59 | 19.54 | 21.00 |
| | | 25 | 13 | 19.90 | 19.73 | 19.66 | 21.00 |
| | | 25 | 25 | 19.67 | 19.66 | 19.42 | 21.00 |
| | | 50 | 0 | 19.61 | 19.61 | 19.59 | 21.00 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 26765 | Channel 26865 | Channel 26965 | Tune up |
|---|---|---|---|---|---|---|---|
| **15MHz** | QPSK | 1 | 0 | **22.75** | 22.68 | 22.62 | 24.00 |
| | | 1 | 38 | 22.65 | 22.62 | 22.57 | 24.00 |
| | | 1 | 74 | 22.70 | 22.71 | 22.65 | 24.00 |
| | | 36 | 0 | 21.64 | 21.71 | 21.59 | 23.00 |
| | | 36 | 18 | 21.79 | **21.82** | 21.77 | 23.00 |
| | | 36 | 39 | 21.72 | 21.71 | 21.58 | 23.00 |
| | | 75 | 0 | 21.70 | 21.81 | 21.67 | 23.00 |
| | 16QAM | 1 | 0 | 22.24 | 21.97 | 21.94 | 23.00 |
| | | 1 | 38 | 22.23 | 21.94 | 22.04 | 23.00 |
| | | 1 | 74 | 22.11 | 22.05 | 21.82 | 23.00 |
| | | 36 | 0 | 20.67 | 20.61 | 20.59 | 22.00 |
| | | 36 | 18 | 20.79 | 20.81 | 20.75 | 22.00 |
| | | 36 | 39 | 20.74 | 20.75 | 20.80 | 22.00 |
| | | 75 | 0 | 20.83 | 20.65 | 20.68 | 22.00 |
| | 64QAM | 1 | 0 | 21.19 | 20.88 | 20.87 | 22.00 |
| | | 1 | 38 | 21.18 | 20.88 | 20.97 | 22.00 |
| | | 1 | 74 | 21.06 | 20.95 | 20.72 | 22.00 |
| | | 36 | 0 | 19.57 | 19.53 | 19.50 | 21.00 |
| | | 36 | 18 | 19.73 | 19.70 | 19.66 | 21.00 |
| | | 36 | 39 | 19.69 | 19.64 | 19.71 | 21.00 |
| | | 75 | 0 | 19.73 | 19.60 | 19.57 | 21.00 |

Table 13：Conducted Power of LTE

## 8.1.2 Conducted Power of Main Antenna(Ant4)

### 8.1.2.1 Conducted Power of GSM

| GSM 850 Receiver off/Hotspot off | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 128 | 190 | 251 | | | 128 | 190 | 251 | |
| GSM(GMSK) | GSM | 32.46 | 32.44 | 32.49 | 33.50 | -9.19 | 23.27 | 23.25 | 23.30 | 24.31 |
| GPRS/ EGPRS (GMSK) | 1 TX Slot | 32.44 | 32.45 | 32.41 | 33.50 | -9.19 | 23.25 | 23.26 | 23.22 | 24.31 |
| | 2 TX Slots | 29.30 | 29.29 | 29.32 | 30.50 | -6.18 | 23.12 | 23.11 | 23.14 | 24.32 |
| | 3 TX Slots | 27.63 | 27.54 | 27.55 | 28.70 | -4.42 | 23.21 | 23.12 | 23.13 | 24.28 |
| | 4 TX Slots | 25.78 | 26.05 | 26.08 | 27.50 | -3.17 | 22.61 | 22.88 | 22.91 | 24.33 |
| EGPRS (8PSK) | 1 TX Slot | 26.42 | 26.38 | 26.40 | 28.00 | -9.19 | 17.23 | 17.19 | 17.21 | 18.81 |
| | 2 TX Slots | 23.49 | 23.51 | 23.54 | 25.00 | -6.18 | 17.31 | 17.33 | 17.36 | 18.82 |
| | 3 TX Slots | 21.88 | 21.90 | 21.79 | 23.20 | -4.42 | 17.46 | 17.48 | 17.37 | 18.78 |
| | 4 TX Slots | 20.49 | 20.53 | 20.54 | 22.00 | -3.17 | 17.32 | 17.36 | 17.37 | 18.83 |

| GSM 850 Receiver on/Hotspot on | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 128 | 190 | 251 | | | 128 | 190 | 251 | |
| GSM(GMSK) | GSM | 28.05 | 27.79 | 28.01 | 29.50 | -9.19 | 18.86 | 18.60 | 18.82 | 20.31 |
| GPRS/ EGPRS (GMSK) | 1 TX Slot | 28.10 | 27.85 | 28.07 | 29.50 | -9.19 | 18.91 | 18.66 | 18.88 | 20.31 |
| | 2 TX Slots | 24.83 | 24.96 | 24.81 | 26.50 | -6.18 | 18.65 | 18.78 | 18.63 | 20.32 |
| | 3 TX Slots | 23.33 | 22.96 | 23.19 | 24.70 | -4.42 | 18.91 | 18.54 | 18.77 | 20.28 |
| | 4 TX Slots | 22.32 | 21.91 | 22.17 | 23.50 | -3.17 | 19.15 | 18.74 | 19.00 | **20.33** |
| EGPRS (8PSK) | 1 TX Slot | 22.09 | 22.11 | 22.08 | 24.00 | -9.19 | 12.90 | 12.92 | 12.89 | 14.81 |
| | 2 TX Slots | 19.01 | 19.09 | 19.07 | 21.00 | -6.18 | 12.83 | 12.91 | 12.89 | 14.82 |
| | 3 TX Slots | 17.25 | 17.21 | 17.29 | 19.20 | -4.42 | 12.83 | 12.79 | 12.87 | 14.78 |
| | 4 TX Slots | 16.19 | 16.00 | 16.06 | 18.00 | -3.17 | 13.02 | 12.83 | 12.89 | 14.83 |

Table 14：Conducted Power of GSM

Note:

1）. CMW500 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

| No. of timeslots | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Duty Cycle | 1:8.3 | 1:4.15 | 1:2.77 | 1:2.075 |
| Time based avg. power compared to slotted avg. power | -9.19 | -6.18 | -4.42 | -3.17 |

2）. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:

Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

3）. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used

### 8.1.2.2 Conducted Power of WCDMA

| WCDMA Band V Receiver off/Hotspot off | | | | | |
|---|---|---|---|---|---|
| Average Conducted Power(dBm) | | | | | |
| Channel | | 4132 | 4182 | 4233 | Tune up |
| WCDMA | 12.2kbps RMC | 23.79 | 23.82 | 23.81 | 24.50 |
| | 12.2kbps AMR | 23.72 | 23.81 | 23.80 | 24.50 |
| HSDPA | Subtest 1 | 22.81 | 22.82 | 22.81 | 23.50 |
| | Subtest 2 | 22.69 | 22.77 | 22.78 | 23.50 |
| | Subtest 3 | 22.23 | 22.26 | 22.30 | 23.00 |
| | Subtest 4 | 22.24 | 22.27 | 22.27 | 23.00 |
| HSUPA | Subtest 1 | 22.77 | 22.82 | 22.81 | 23.50 |
| | Subtest 2 | 20.76 | 20.79 | 20.81 | 21.50 |
| | Subtest 3 | 21.79 | 21.86 | 21.84 | 22.50 |
| | Subtest 4 | 20.78 | 20.77 | 20.75 | 21.50 |
| | Subtest 5 | 22.79 | 22.86 | 22.85 | 23.50 |
| DC-HSDPA | Subtest 1 | 22.82 | 22.83 | 22.82 | 23.50 |
| | Subtest 2 | 22.65 | 22.78 | 22.73 | 23.50 |
| | Subtest 3 | 22.20 | 22.22 | 22.31 | 23.00 |
| | Subtest 4 | 22.21 | 22.24 | 22.24 | 23.00 |
| HSPA+ | 16QAM | 21.33 | 21.28 | 21.21 | 22.00 |
| **WCDMA Band V Receiver on/Hotspot on** | | | | | |
| Average Conducted Power(dBm) | | | | | |
| Channel | | 4132 | 4182 | 4233 | Tune up |
| WCDMA | 12.2kbps RMC | 21.29 | 21.35 | 21.32 | 22.50 |
| | 12.2kbps AMR | 21.25 | 21.33 | 21.28 | 22.50 |
| HSDPA | Subtest 1 | 20.67 | 20.69 | 20.68 | 21.50 |
| | Subtest 2 | 20.54 | 20.62 | 20.64 | 21.50 |
| | Subtest 3 | 20.10 | 20.07 | 20.14 | 21.00 |
| | Subtest 4 | 20.10 | 20.12 | 20.15 | 21.00 |
| HSUPA | Subtest 1 | 20.59 | 20.70 | 20.68 | 21.50 |
| | Subtest 2 | 18.64 | 18.65 | 18.63 | 19.50 |
| | Subtest 3 | 19.62 | 19.68 | 19.71 | 20.50 |
| | Subtest 4 | 18.64 | 18.61 | 18.59 | 19.50 |
| | Subtest 5 | 20.66 | 20.76 | 20.69 | 21.50 |
| DC-HSDPA | Subtest 1 | 20.71 | 20.73 | 20.71 | 21.50 |
| | Subtest 2 | 20.51 | 20.68 | 20.61 | 21.50 |
| | Subtest 3 | 20.04 | 20.03 | 20.21 | 21.00 |
| | Subtest 4 | 20.01 | 20.10 | 20.08 | 21.00 |
| HSPA+ | 16QAM | 19.23 | 19.10 | 19.09 | 20.00 |

Table 15：Conducted Power of WCDMA

Note:

1) when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

### 8.1.2.3 Conducted Power of LTE

| LTE Band 5 Receiver off/Hotspot off | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20407 | Channel 20525 | Channel 20643 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 23.48 | 23.47 | 23.34 | 24.50 |
| | | 1 | 2 | 23.54 | 23.48 | 23.42 | 24.50 |
| | | 1 | 5 | 23.41 | 23.39 | 23.31 | 24.50 |
| | | 3 | 0 | 23.48 | 23.37 | 23.20 | 24.50 |
| | | 3 | 2 | 23.60 | 23.45 | 23.39 | 24.50 |
| | | 3 | 3 | 23.45 | 23.44 | 23.38 | 24.50 |
| | | 6 | 0 | 22.61 | 22.57 | 22.41 | 23.50 |
| | 16QAM | 1 | 0 | 22.76 | 23.15 | 22.99 | 23.50 |
| | | 1 | 2 | 22.69 | 22.60 | 22.79 | 23.50 |
| | | 1 | 5 | 22.82 | 23.17 | 22.60 | 23.50 |
| | | 3 | 0 | 22.47 | 22.60 | 22.58 | 23.50 |
| | | 3 | 2 | 22.52 | 22.50 | 22.48 | 23.50 |
| | | 3 | 3 | 22.49 | 22.50 | 22.45 | 23.50 |
| | | 6 | 0 | 21.83 | 21.60 | 21.31 | 22.50 |
| | 64QAM | 1 | 0 | 21.75 | 21.65 | 21.75 | 22.50 |
| | | 1 | 2 | 21.67 | 21.64 | 21.83 | 22.50 |
| | | 1 | 5 | 21.84 | 21.71 | 21.61 | 22.50 |
| | | 3 | 0 | 21.45 | 21.61 | 21.58 | 22.50 |
| | | 3 | 2 | 21.58 | 21.49 | 21.46 | 22.50 |
| | | 3 | 3 | 21.55 | 21.52 | 21.50 | 22.50 |
| | | 6 | 0 | 20.79 | 20.56 | 20.36 | 21.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20415 | Channel 20525 | Channel 20635 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 23.56 | 23.52 | 23.40 | 24.50 |
| | | 1 | 7 | 23.53 | 23.49 | 23.49 | 24.50 |
| | | 1 | 14 | 23.54 | 23.42 | 23.32 | 24.50 |
| | | 8 | 0 | 22.71 | 22.67 | 22.50 | 23.50 |
| | | 8 | 4 | 22.66 | 22.62 | 22.54 | 23.50 |
| | | 8 | 7 | 22.63 | 22.55 | 22.49 | 23.50 |
| | | 15 | 0 | 22.63 | 22.64 | 22.55 | 23.50 |
| | 16QAM | 1 | 0 | 22.62 | 22.52 | 23.13 | 23.50 |
| | | 1 | 7 | 22.68 | 22.69 | 22.98 | 23.50 |
| | | 1 | 14 | 22.47 | 22.88 | 22.61 | 23.50 |
| | | 8 | 0 | 21.61 | 21.73 | 21.67 | 22.50 |
| | | 8 | 4 | 21.78 | 21.70 | 21.57 | 22.50 |
| | | 8 | 7 | 21.68 | 21.81 | 21.64 | 22.50 |
| | | 15 | 0 | 21.72 | 21.68 | 21.48 | 22.50 |
| | 64QAM | 1 | 0 | 21.52 | 21.63 | 21.61 | 22.50 |
| | | 1 | 7 | 21.73 | 21.65 | 21.47 | 22.50 |
| | | 1 | 14 | 21.59 | 21.72 | 21.58 | 22.50 |
| | | 8 | 0 | 20.60 | 20.72 | 20.65 | 21.50 |
| | | 8 | 4 | 20.84 | 20.66 | 20.60 | 21.50 |
| | | 8 | 7 | 20.66 | 20.84 | 20.63 | 21.50 |
| | | 15 | 0 | 20.74 | 20.69 | 20.51 | 21.50 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 20425 | Channel 20525 | Channel 20625 | Tune up |
|---|---|---|---|---|---|---|---|
| **5MHz** | QPSK | 1 | 0 | 23.57 | 23.55 | 23.40 | 24.50 |
| | | 1 | 13 | 23.58 | 23.54 | 23.49 | 24.50 |
| | | 1 | 24 | 23.56 | 23.43 | 23.35 | 24.50 |
| | | 12 | 0 | 22.69 | 22.68 | 22.53 | 23.50 |
| | | 12 | 6 | 22.62 | 22.63 | 22.52 | 23.50 |
| | | 12 | 13 | 22.58 | 22.59 | 22.44 | 23.50 |
| | | 25 | 0 | 22.61 | 22.60 | 22.51 | 23.50 |
| | 16QAM | 1 | 0 | 22.64 | 22.50 | 23.13 | 23.50 |
| | | 1 | 13 | 22.70 | 22.68 | 23.03 | 23.50 |
| | | 1 | 24 | 22.51 | 22.83 | 22.66 | 23.50 |
| | | 12 | 0 | 21.65 | 21.78 | 21.67 | 22.50 |
| | | 12 | 6 | 21.81 | 21.68 | 21.52 | 22.50 |
| | | 12 | 13 | 21.70 | 21.83 | 21.68 | 22.50 |
| | | 25 | 0 | 21.74 | 21.68 | 21.53 | 22.50 |
| | 64QAM | 1 | 0 | 21.58 | 21.72 | 21.58 | 22.50 |
| | | 1 | 13 | 21.76 | 21.59 | 21.42 | 22.50 |
| | | 1 | 24 | 21.61 | 21.74 | 21.61 | 22.50 |
| | | 12 | 0 | 20.71 | 20.79 | 20.72 | 21.50 |
| | | 12 | 6 | 20.79 | 20.71 | 20.53 | 21.50 |
| | | 12 | 13 | 20.69 | 20.86 | 20.66 | 21.50 |
| | | 25 | 0 | 20.75 | 20.70 | 20.53 | 21.50 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 20450 | Channel 20525 | Channel 20600 | Tune up |
|---|---|---|---|---|---|---|---|
| **10MHz** | QPSK | 1 | 0 | 23.48 | **23.75** | 23.48 | 24.50 |
| | | 1 | 25 | 23.75 | 23.54 | 23.51 | 24.50 |
| | | 1 | 49 | 23.56 | 23.46 | 23.49 | 24.50 |
| | | 25 | 0 | 22.65 | 22.54 | 22.50 | 23.50 |
| | | 25 | 13 | 22.65 | 22.63 | 22.57 | 23.50 |
| | | 25 | 25 | **22.68** | 22.57 | 22.46 | 23.50 |
| | | 50 | 0 | 22.53 | 22.55 | 22.32 | 23.50 |
| | 16QAM | 1 | 0 | 23.43 | 22.86 | 22.78 | 23.50 |
| | | 1 | 25 | 23.28 | 22.32 | 22.38 | 23.50 |
| | | 1 | 49 | 22.94 | 22.70 | 23.20 | 23.50 |
| | | 25 | 0 | 21.55 | 21.51 | 21.59 | 22.50 |
| | | 25 | 13 | 21.67 | 21.53 | 21.62 | 22.50 |
| | | 25 | 25 | 21.63 | 21.64 | 21.55 | 22.50 |
| | | 50 | 0 | 21.45 | 21.38 | 21.37 | 22.50 |
| | 64QAM | 1 | 0 | 21.45 | 21.44 | 21.53 | 22.50 |
| | | 1 | 25 | 21.61 | 21.48 | 21.53 | 22.50 |
| | | 1 | 49 | 21.53 | 21.59 | 21.46 | 22.50 |
| | | 25 | 0 | 20.55 | 20.55 | 20.56 | 21.50 |
| | | 25 | 13 | 20.63 | 20.50 | 20.66 | 21.50 |
| | | 25 | 25 | 20.67 | 20.68 | 20.61 | 21.50 |
| | | 50 | 0 | 20.42 | 20.43 | 20.42 | 21.50 |

| LTE Band 5 Receiver on/Hotspot on | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | RB size | RB offset | Channel 20407 | Channel 20525 | Channel 20643 | Tune up |
| 1.4MHz | QPSK | 1 | 0 | 21.13 | 21.13 | 21.09 | 22.50 |
| | | 1 | 2 | 21.15 | 21.30 | 21.10 | 22.50 |
| | | 1 | 5 | 21.07 | 21.12 | 21.12 | 22.50 |
| | | 3 | 0 | 21.17 | 21.10 | 21.02 | 22.50 |
| | | 3 | 2 | 21.19 | 21.22 | 21.08 | 22.50 |
| | | 3 | 3 | 21.10 | 21.17 | 21.08 | 22.50 |
| | | 6 | 0 | 21.29 | 21.23 | 21.16 | 22.50 |
| | 16QAM | 1 | 0 | 21.52 | 20.86 | 21.39 | 22.50 |
| | | 1 | 2 | 21.33 | 21.51 | 20.96 | 22.50 |
| | | 1 | 5 | 21.04 | 21.48 | 21.08 | 22.50 |
| | | 3 | 0 | 21.07 | 21.15 | 20.86 | 22.50 |
| | | 3 | 2 | 21.12 | 21.09 | 20.95 | 22.50 |
| | | 3 | 3 | 21.01 | 21.02 | 20.89 | 22.50 |
| | | 6 | 0 | 21.02 | 21.04 | 20.93 | 22.50 |
| | 64QAM | 1 | 0 | 21.43 | 21.52 | 21.41 | 22.50 |
| | | 1 | 2 | 21.45 | 21.49 | 21.51 | 22.50 |
| | | 1 | 5 | 21.52 | 21.43 | 21.52 | 22.50 |
| | | 3 | 0 | 21.39 | 21.48 | 21.53 | 22.50 |
| | | 3 | 2 | 21.53 | 21.44 | 21.45 | 22.50 |
| | | 3 | 3 | 21.53 | 21.45 | 21.46 | 22.50 |
| | | 6 | 0 | 20.72 | 20.48 | 20.34 | 21.50 |
| Bandwidth | Modulation | RB size | RB offset | Channel 20415 | Channel 20525 | Channel 20635 | Tune up |
| 3MHz | QPSK | 1 | 0 | 21.19 | 21.16 | 21.09 | 22.50 |
| | | 1 | 7 | 21.26 | 21.20 | 21.08 | 22.50 |
| | | 1 | 14 | 21.29 | 21.24 | 21.06 | 22.50 |
| | | 8 | 0 | 21.31 | 21.29 | 21.25 | 22.50 |
| | | 8 | 4 | 21.32 | 21.32 | 21.24 | 22.50 |
| | | 8 | 7 | 21.28 | 21.31 | 21.25 | 22.50 |
| | | 15 | 0 | 21.34 | 21.28 | 21.23 | 22.50 |
| | 16QAM | 1 | 0 | 21.43 | 21.46 | 21.01 | 22.50 |
| | | 1 | 7 | 20.88 | 21.00 | 21.33 | 22.50 |
| | | 1 | 14 | 20.99 | 21.43 | 21.13 | 22.50 |
| | | 8 | 0 | 21.04 | 21.15 | 21.03 | 22.50 |
| | | 8 | 4 | 21.04 | 21.25 | 21.10 | 22.50 |
| | | 8 | 7 | 21.14 | 21.10 | 21.10 | 22.50 |
| | | 15 | 0 | 21.06 | 21.12 | 21.06 | 22.50 |
| | 64QAM | 1 | 0 | 21.45 | 21.42 | 21.42 | 22.50 |
| | | 1 | 7 | 21.39 | 21.41 | 21.42 | 22.50 |
| | | 1 | 14 | 21.40 | 21.36 | 21.41 | 22.50 |
| | | 8 | 0 | 20.58 | 20.65 | 20.64 | 21.50 |
| | | 8 | 4 | 20.79 | 20.64 | 20.59 | 21.50 |
| | | 8 | 7 | 20.61 | 20.81 | 20.62 | 21.50 |
| | | 15 | 0 | 20.73 | 20.64 | 20.45 | 21.50 |

| Bandwidth | Modulation | RB size | RB offset | Channel 20425 | Channel 20525 | Channel 20625 | Tune up |
|---|---|---|---|---|---|---|---|
| 5MHz | QPSK | 1 | 0 | 21.22 | 21.03 | 21.01 | 22.50 |
| | | 1 | 13 | 21.22 | 21.35 | 21.13 | 22.50 |
| | | 1 | 24 | 21.27 | 21.24 | 21.09 | 22.50 |
| | | 12 | 0 | 21.21 | 21.26 | 21.20 | 22.50 |
| | | 12 | 6 | 21.42 | 21.32 | 21.22 | 22.50 |
| | | 12 | 13 | 21.31 | 21.28 | 21.33 | 22.50 |
| | | 25 | 0 | 21.35 | 21.34 | 21.21 | 22.50 |
| | 16QAM | 1 | 0 | 21.10 | 21.20 | 21.06 | 22.50 |
| | | 1 | 13 | 21.43 | 21.22 | 21.23 | 22.50 |
| | | 1 | 24 | 21.42 | 21.43 | 21.41 | 22.50 |
| | | 12 | 0 | 20.99 | 20.95 | 20.94 | 22.50 |
| | | 12 | 6 | 21.09 | 21.09 | 21.05 | 22.50 |
| | | 12 | 13 | 21.18 | 21.08 | 21.10 | 22.50 |
| | | 25 | 0 | 21.07 | 20.90 | 20.93 | 22.50 |
| | 64QAM | 1 | 0 | 21.41 | 21.39 | 21.42 | 22.50 |
| | | 1 | 13 | 21.38 | 21.43 | 21.33 | 22.50 |
| | | 1 | 24 | 21.40 | 21.35 | 21.41 | 22.50 |
| | | 12 | 0 | 20.68 | 20.74 | 20.70 | 21.50 |
| | | 12 | 6 | 20.74 | 20.67 | 20.50 | 21.50 |
| | | 12 | 13 | 20.67 | 20.78 | 20.60 | 21.50 |
| | | 25 | 0 | 20.68 | 20.62 | 20.49 | 21.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 20450 | Channel 20525 | Channel 20600 | Tune up |
| 10MHz | QPSK | 1 | 0 | 21.21 | **21.35** | 21.06 | 22.50 |
| | | 1 | 25 | 21.26 | 20.96 | 21.16 | 22.50 |
| | | 1 | 49 | 20.98 | 20.83 | 21.16 | 22.50 |
| | | 25 | 0 | 21.09 | 21.07 | 21.32 | 22.50 |
| | | 25 | 13 | 21.11 | 21.10 | 21.31 | 22.50 |
| | | 25 | 25 | 21.21 | **21.37** | 21.28 | 22.50 |
| | | 50 | 0 | 21.00 | 20.95 | 21.36 | 22.50 |
| | 16QAM | 1 | 0 | 21.55 | 21.30 | 21.06 | 22.50 |
| | | 1 | 25 | 21.38 | 21.24 | 21.31 | 22.50 |
| | | 1 | 49 | 21.32 | 21.43 | 20.97 | 22.50 |
| | | 25 | 0 | 21.12 | 21.11 | 21.11 | 22.50 |
| | | 25 | 13 | 21.19 | 21.13 | 21.00 | 22.50 |
| | | 25 | 25 | 21.13 | 21.17 | 21.16 | 22.50 |
| | | 50 | 0 | 21.09 | 21.03 | 20.98 | 22.50 |
| | 64QAM | 1 | 0 | 21.35 | 21.37 | 21.43 | 22.50 |
| | | 1 | 25 | 21.41 | 21.39 | 21.41 | 22.50 |
| | | 1 | 49 | 21.40 | 21.42 | 21.36 | 22.50 |
| | | 25 | 0 | 20.49 | 20.52 | 20.50 | 21.50 |
| | | 25 | 13 | 20.55 | 20.42 | 20.61 | 21.50 |
| | | 25 | 25 | 20.61 | 20.65 | 20.59 | 21.50 |
| | | 50 | 0 | 20.37 | 20.38 | 20.39 | 21.50 |

| LTE Band 26 Receiver off/Hotspot off | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| Bandwidth | Modulation | RB size | RB offset | Channel 26697 | Channel 26865 | Channel 27033 | Tune up |
| 1.4MHz | QPSK | 1 | 0 | 23.29 | 23.13 | 23.05 | 25.00 |
| | | 1 | 2 | 23.26 | 23.18 | 23.20 | 25.00 |
| | | 1 | 5 | 23.26 | 23.19 | 23.10 | 25.00 |
| | | 3 | 0 | 23.25 | 23.17 | 23.06 | 25.00 |
| | | 3 | 2 | 23.30 | 23.26 | 23.22 | 25.00 |
| | | 3 | 3 | 23.28 | 23.21 | 23.18 | 25.00 |
| | | 6 | 0 | 22.37 | 22.30 | 22.22 | 24.00 |
| | 16QAM | 1 | 0 | 22.34 | 22.10 | 22.11 | 24.00 |
| | | 1 | 2 | 22.44 | 22.28 | 22.27 | 24.00 |
| | | 1 | 5 | 22.34 | 22.17 | 22.28 | 24.00 |
| | | 3 | 0 | 22.42 | 22.35 | 22.23 | 24.00 |
| | | 3 | 2 | 22.22 | 22.40 | 22.23 | 24.00 |
| | | 3 | 3 | 22.46 | 22.27 | 22.04 | 24.00 |
| | | 6 | 0 | 21.39 | 21.20 | 21.19 | 23.00 |
| | 64QAM | 1 | 0 | 21.24 | 21.01 | 21.06 | 23.00 |
| | | 1 | 2 | 21.39 | 21.17 | 21.20 | 23.00 |
| | | 1 | 5 | 21.23 | 21.06 | 21.18 | 23.00 |
| | | 3 | 0 | 21.33 | 21.26 | 21.13 | 23.00 |
| | | 3 | 2 | 21.15 | 21.30 | 21.14 | 23.00 |
| | | 3 | 3 | 21.35 | 21.16 | 21.09 | 23.00 |
| | | 6 | 0 | 20.30 | 20.10 | 20.13 | 22.00 |
| Bandwidth | Modulation | RB size | RB offset | Channel 26705 | Channel 26865 | Channel 27025 | Tune up |
| 3MHz | QPSK | 1 | 0 | 23.53 | 23.29 | 23.29 | 25.00 |
| | | 1 | 7 | 23.68 | 23.46 | 23.39 | 25.00 |
| | | 1 | 14 | 23.45 | 23.44 | 23.34 | 25.00 |
| | | 8 | 0 | 22.65 | 22.52 | 22.51 | 24.00 |
| | | 8 | 4 | 22.59 | 22.59 | 22.53 | 24.00 |
| | | 8 | 7 | 22.62 | 22.56 | 22.52 | 24.00 |
| | | 15 | 0 | 22.57 | 22.55 | 22.51 | 24.00 |
| | 16QAM | 1 | 0 | 22.93 | 22.70 | 22.77 | 24.00 |
| | | 1 | 7 | 22.70 | 22.84 | 22.71 | 24.00 |
| | | 1 | 14 | 23.10 | 22.83 | 22.60 | 24.00 |
| | | 8 | 0 | 21.70 | 21.52 | 21.55 | 23.00 |
| | | 8 | 4 | 21.56 | 21.57 | 21.65 | 23.00 |
| | | 8 | 7 | 21.72 | 21.53 | 21.58 | 23.00 |
| | | 15 | 0 | 21.70 | 21.56 | 21.47 | 23.00 |
| | 64QAM | 1 | 0 | 21.84 | 21.59 | 21.67 | 23.00 |
| | | 1 | 7 | 21.60 | 21.79 | 21.66 | 23.00 |
| | | 1 | 14 | 22.05 | 21.74 | 21.53 | 23.00 |
| | | 8 | 0 | 20.64 | 20.41 | 20.49 | 22.00 |
| | | 8 | 4 | 20.45 | 20.50 | 20.60 | 22.00 |
| | | 8 | 7 | 20.65 | 20.42 | 20.52 | 22.00 |
| | | 15 | 0 | 20.61 | 20.51 | 20.38 | 22.00 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 26715 | Channel 26865 | Channel 27015 | Tune up |
|---|---|---|---|---|---|---|---|
| **5MHz** | QPSK | 1 | 0 | 23.37 | 23.42 | 23.51 | 25.00 |
| | | 1 | 13 | 23.56 | 23.50 | 23.46 | 25.00 |
| | | 1 | 24 | 23.52 | 23.47 | 23.43 | 25.00 |
| | | 12 | 0 | 22.57 | 22.40 | 22.51 | 24.00 |
| | | 12 | 6 | 22.63 | 22.60 | 22.56 | 24.00 |
| | | 12 | 13 | 22.56 | 22.52 | 22.47 | 24.00 |
| | | 25 | 0 | 22.64 | 22.57 | 22.39 | 24.00 |
| | 16QAM | 1 | 0 | 22.58 | 22.59 | 22.34 | 24.00 |
| | | 1 | 13 | 22.52 | 22.72 | 22.47 | 24.00 |
| | | 1 | 24 | 22.63 | 22.70 | 22.38 | 24.00 |
| | | 12 | 0 | 21.67 | 21.50 | 21.48 | 23.00 |
| | | 12 | 6 | 21.63 | 21.68 | 21.60 | 23.00 |
| | | 12 | 13 | 21.69 | 21.66 | 21.60 | 23.00 |
| | | 25 | 0 | 21.65 | 21.64 | 21.46 | 23.00 |
| | 64QAM | 1 | 0 | 21.50 | 21.49 | 21.27 | 23.00 |
| | | 1 | 13 | 21.42 | 21.66 | 21.38 | 23.00 |
| | | 1 | 24 | 21.56 | 21.61 | 21.30 | 23.00 |
| | | 12 | 0 | 20.56 | 20.40 | 20.38 | 22.00 |
| | | 12 | 6 | 20.57 | 20.60 | 20.53 | 22.00 |
| | | 12 | 13 | 20.64 | 20.56 | 20.51 | 22.00 |
| | | 25 | 0 | 20.59 | 20.53 | 20.37 | 22.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26740 | Channel 26865 | Channel 26990 | Tune up |
| **10MHz** | QPSK | 1 | 0 | 23.37 | 23.33 | 23.29 | 25.00 |
| | | 1 | 25 | 23.19 | 23.34 | 23.09 | 25.00 |
| | | 1 | 49 | 23.44 | 23.34 | 23.17 | 25.00 |
| | | 25 | 0 | 22.24 | 22.27 | 22.25 | 24.00 |
| | | 25 | 13 | 22.40 | 22.46 | 22.43 | 24.00 |
| | | 25 | 25 | 22.35 | 22.40 | 22.41 | 24.00 |
| | | 50 | 0 | 22.42 | 22.35 | 22.33 | 24.00 |
| | 16QAM | 1 | 0 | 22.76 | 22.87 | 22.94 | 24.00 |
| | | 1 | 25 | 22.79 | 22.72 | 22.56 | 24.00 |
| | | 1 | 49 | 22.98 | 22.90 | 22.70 | 24.00 |
| | | 25 | 0 | 21.31 | 21.22 | 21.17 | 23.00 |
| | | 25 | 13 | 21.44 | 21.42 | 21.50 | 23.00 |
| | | 25 | 25 | 21.29 | 21.32 | 21.38 | 23.00 |
| | | 50 | 0 | 21.40 | 21.27 | 21.34 | 23.00 |
| | 64QAM | 1 | 0 | 21.69 | 21.81 | 21.84 | 23.00 |
| | | 1 | 25 | 21.70 | 21.64 | 21.46 | 23.00 |
| | | 1 | 49 | 21.88 | 21.81 | 21.65 | 23.00 |
| | | 25 | 0 | 20.24 | 20.15 | 20.08 | 22.00 |
| | | 25 | 13 | 20.37 | 20.36 | 20.40 | 22.00 |
| | | 25 | 25 | 20.21 | 20.23 | 20.27 | 22.00 |
| | | 50 | 0 | 20.29 | 20.17 | 20.25 | 22.00 |

| Bandwidth | Modulation | RB size | RB offset | Channel 26765 | Channel 26865 | Channel 26965 | Tune up |
|---|---|---|---|---|---|---|---|
| 15MHz | QPSK | 1 | 0 | **23.50** | 23.41 | 23.19 | 25.00 |
| | | 1 | 38 | 23.40 | 23.27 | 23.15 | 25.00 |
| | | 1 | 74 | 23.44 | 23.37 | 23.23 | 25.00 |
| | | 36 | 0 | 22.36 | 22.36 | 22.26 | 24.00 |
| | | 36 | 18 | 22.55 | 22.52 | 22.39 | 24.00 |
| | | 36 | 39 | 22.47 | **22.56** | 22.37 | 24.00 |
| | | 75 | 0 | 22.40 | 22.51 | 22.33 | 24.00 |
| | 16QAM | 1 | 0 | 22.77 | 22.54 | 22.54 | 24.00 |
| | | 1 | 38 | 22.41 | 22.49 | 22.50 | 24.00 |
| | | 1 | 74 | 22.49 | 22.41 | 22.08 | 24.00 |
| | | 36 | 0 | 21.44 | 21.23 | 21.25 | 23.00 |
| | | 36 | 18 | 21.52 | 21.38 | 21.37 | 23.00 |
| | | 36 | 39 | 21.43 | 21.35 | 21.38 | 23.00 |
| | | 75 | 0 | 21.45 | 21.38 | 21.39 | 23.00 |
| | 64QAM | 1 | 0 | 21.69 | 21.49 | 21.44 | 23.00 |
| | | 1 | 38 | 21.36 | 21.42 | 21.41 | 23.00 |
| | | 1 | 74 | 21.39 | 21.31 | 21.07 | 23.00 |
| | | 36 | 0 | 20.34 | 20.13 | 20.17 | 22.00 |
| | | 36 | 18 | 20.41 | 20.27 | 20.31 | 22.00 |
| | | 36 | 39 | 20.38 | 20.27 | 20.29 | 22.00 |
| | | 75 | 0 | 20.36 | 20.29 | 20.31 | 22.00 |

| LTE Band 26 Head Receiver on/Hotspot on | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26697 | Channel 26865 | Channel 27033 | Tune up |
| 1.4MHz | QPSK | 1 | 0 | 21.03 | 20.87 | 20.93 | 22.50 |
| | | 1 | 2 | 21.15 | 21.09 | 20.90 | 22.50 |
| | | 1 | 5 | 21.09 | 20.98 | 20.91 | 22.50 |
| | | 3 | 0 | 21.06 | 21.00 | 20.93 | 22.50 |
| | | 3 | 2 | 21.18 | 21.06 | 21.05 | 22.50 |
| | | 3 | 3 | 21.08 | 20.93 | 20.81 | 22.50 |
| | | 6 | 0 | 21.13 | 21.13 | 21.12 | 22.50 |
| | 16QAM | 1 | 0 | 21.57 | 21.14 | 20.90 | 22.50 |
| | | 1 | 2 | 21.07 | 21.13 | 21.09 | 22.50 |
| | | 1 | 5 | 21.01 | 21.21 | 21.06 | 22.50 |
| | | 3 | 0 | 20.98 | 21.19 | 21.06 | 22.50 |
| | | 3 | 2 | 21.25 | 21.14 | 20.98 | 22.50 |
| | | 3 | 3 | 21.13 | 21.04 | 20.85 | 22.50 |
| | | 6 | 0 | 21.21 | 21.24 | 21.10 | 22.50 |
| | 64QAM | 1 | 0 | 21.31 | 21.32 | 21.59 | 22.50 |
| | | 1 | 2 | 21.31 | 21.05 | 21.09 | 22.50 |
| | | 1 | 5 | 21.09 | 21.65 | 21.24 | 22.50 |
| | | 3 | 0 | 20.85 | 20.93 | 21.04 | 22.50 |
| | | 3 | 2 | 21.21 | 21.16 | 21.14 | 22.50 |
| | | 3 | 3 | 20.96 | 21.02 | 20.96 | 22.50 |
| | | 6 | 0 | 21.10 | 21.01 | 20.90 | 22.50 |

| Bandwidth | Modulation | RB size | RB offset | Channel 26705 | Channel 26865 | Channel 27025 | Tune up |
|---|---|---|---|---|---|---|---|
| 3MHz | QPSK | 1 | 0 | 21.16 | 20.90 | 21.03 | 22.50 |
| | | 1 | 7 | 21.25 | 21.07 | 21.14 | 22.50 |
| | | 1 | 14 | 21.07 | 21.02 | 21.06 | 22.50 |
| | | 8 | 0 | 21.24 | 21.12 | 21.09 | 22.50 |
| | | 8 | 4 | 21.19 | 21.19 | 21.13 | 22.50 |
| | | 8 | 7 | 21.16 | 21.16 | 21.06 | 22.50 |
| | | 15 | 0 | 21.21 | 21.09 | 21.14 | 22.50 |
| | 16QAM | 1 | 0 | 21.26 | 21.23 | 21.23 | 22.50 |
| | | 1 | 7 | 21.08 | 21.57 | 21.70 | 22.50 |
| | | 1 | 14 | 21.29 | 21.44 | 21.38 | 22.50 |
| | | 8 | 0 | 21.21 | 21.30 | 21.19 | 22.50 |
| | | 8 | 4 | 21.29 | 21.28 | 21.26 | 22.50 |
| | | 8 | 7 | 21.15 | 21.16 | 21.25 | 22.50 |
| | | 15 | 0 | 21.22 | 21.18 | 21.25 | 22.50 |
| | 64QAM | 1 | 0 | 21.46 | 21.15 | 21.33 | 22.50 |
| | | 1 | 7 | 21.55 | 21.54 | 21.01 | 22.50 |
| | | 1 | 14 | 21.15 | 21.22 | 21.06 | 22.50 |
| | | 8 | 0 | 21.04 | 21.01 | 20.98 | 22.50 |
| | | 8 | 4 | 21.00 | 20.99 | 21.15 | 22.50 |
| | | 8 | 7 | 21.03 | 21.14 | 21.03 | 22.50 |
| | | 15 | 0 | 21.02 | 21.12 | 20.94 | 22.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26715 | Channel 26865 | Channel 27015 | Tune up |
| 5MHz | QPSK | 1 | 0 | 20.98 | 20.94 | 20.95 | 22.50 |
| | | 1 | 13 | 21.19 | 21.17 | 21.20 | 22.50 |
| | | 1 | 24 | 21.15 | 21.15 | 20.95 | 22.50 |
| | | 12 | 0 | 21.19 | 21.09 | 21.01 | 22.50 |
| | | 12 | 6 | 21.22 | 21.13 | 21.16 | 22.50 |
| | | 12 | 13 | 21.16 | 21.11 | 21.09 | 22.50 |
| | | 25 | 0 | 21.12 | 21.09 | 21.08 | 22.50 |
| | 16QAM | 1 | 0 | 21.55 | 21.23 | 21.42 | 22.50 |
| | | 1 | 13 | 21.66 | 21.65 | 21.08 | 22.50 |
| | | 1 | 24 | 21.22 | 21.33 | 21.15 | 22.50 |
| | | 12 | 0 | 21.10 | 21.07 | 21.09 | 22.50 |
| | | 12 | 6 | 21.05 | 21.10 | 21.26 | 22.50 |
| | | 12 | 13 | 21.08 | 21.24 | 21.10 | 22.50 |
| | | 25 | 0 | 21.10 | 21.18 | 21.00 | 22.50 |
| | 64QAM | 1 | 0 | 21.17 | 21.14 | 21.16 | 22.50 |
| | | 1 | 13 | 21.00 | 21.49 | 21.59 | 22.50 |
| | | 1 | 24 | 21.18 | 21.39 | 21.33 | 22.50 |
| | | 12 | 0 | 21.12 | 21.25 | 21.11 | 22.50 |
| | | 12 | 6 | 21.18 | 21.21 | 21.15 | 22.50 |
| | | 12 | 13 | 21.06 | 21.06 | 21.15 | 22.50 |
| | | 25 | 0 | 21.13 | 21.12 | 21.15 | 22.50 |

| **Bandwidth** | Modulation | RB size | RB offset | Channel 26740 | Channel 26865 | Channel 26990 | Tune up |
|---|---|---|---|---|---|---|---|
| **10MHz** | QPSK | 1 | 0 | 20.98 | 20.96 | 20.90 | 22.50 |
| | | 1 | 25 | 20.81 | 20.88 | 21.02 | 22.50 |
| | | 1 | 49 | 21.23 | 20.89 | 20.92 | 22.50 |
| | | 25 | 0 | 20.96 | 21.03 | 20.99 | 22.50 |
| | | 25 | 13 | 21.16 | 21.16 | 21.19 | 22.50 |
| | | 25 | 25 | 21.18 | 21.07 | 21.02 | 22.50 |
| | | 50 | 0 | 21.07 | 21.02 | 21.03 | 22.50 |
| | 16QAM | 1 | 0 | 21.40 | 21.41 | 21.67 | 22.50 |
| | | 1 | 25 | 21.38 | 21.16 | 21.15 | 22.50 |
| | | 1 | 49 | 21.16 | 21.75 | 21.29 | 22.50 |
| | | 25 | 0 | 20.93 | 21.01 | 21.09 | 22.50 |
| | | 25 | 13 | 21.26 | 21.25 | 21.22 | 22.50 |
| | | 25 | 25 | 21.07 | 21.11 | 21.05 | 22.50 |
| | | 50 | 0 | 21.19 | 21.12 | 20.99 | 22.50 |
| | 64QAM | 1 | 0 | 21.57 | 21.44 | 21.46 | 22.50 |
| | | 1 | 25 | 21.22 | 21.17 | 21.30 | 22.50 |
| | | 1 | 49 | 20.97 | 21.11 | 20.90 | 22.50 |
| | | 25 | 0 | 20.93 | 20.82 | 20.91 | 22.50 |
| | | 25 | 13 | 21.09 | 21.00 | 21.05 | 22.50 |
| | | 25 | 25 | 20.98 | 20.81 | 21.01 | 22.50 |
| | | 50 | 0 | 20.95 | 20.95 | 21.15 | 22.50 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 26765 | Channel 26865 | Channel 26965 | Tune up |
| **15MHz** | QPSK | 1 | 0 | **21.05** | 21.02 | 20.96 | 22.50 |
| | | 1 | 38 | 20.99 | 20.90 | 21.02 | 22.50 |
| | | 1 | 74 | 21.02 | 21.02 | 20.97 | 22.50 |
| | | 36 | 0 | 20.93 | 20.92 | 20.91 | 22.50 |
| | | 36 | 18 | **21.15** | **21.17** | **21.16** | 22.50 |
| | | 36 | 39 | 21.03 | 21.04 | 20.92 | 22.50 |
| | | 75 | 0 | 21.06 | 21.03 | **21.17** | 22.50 |
| | 16QAM | 1 | 0 | 21.50 | 21.49 | 21.48 | 22.50 |
| | | 1 | 38 | 21.29 | 21.22 | 21.37 | 22.50 |
| | | 1 | 74 | 21.05 | 21.16 | 20.96 | 22.50 |
| | | 36 | 0 | 21.00 | 20.90 | 20.96 | 22.50 |
| | | 36 | 18 | 21.14 | 21.05 | 21.10 | 22.50 |
| | | 36 | 39 | 21.05 | 20.92 | 21.09 | 22.50 |
| | | 75 | 0 | 21.05 | 21.04 | 21.20 | 22.50 |
| | 64QAM | 1 | 0 | 21.47 | 21.08 | 20.82 | 22.50 |
| | | 1 | 38 | 21.00 | 21.02 | 21.04 | 22.50 |
| | | 1 | 74 | 20.94 | 21.11 | 21.00 | 22.50 |
| | | 36 | 0 | 20.93 | 21.10 | 20.96 | 22.50 |
| | | 36 | 18 | 21.19 | 21.05 | 20.92 | 22.50 |
| | | 36 | 39 | 21.07 | 20.98 | 20.75 | 22.50 |
| | | 75 | 0 | 21.14 | 21.17 | 21.00 | 22.50 |

Table 16：Conducted Power of LTE

## 8.1.3 Conducted Power of Main Antenna(Ant5)

### 8.1.3.1 Conducted Power of GSM

| GSM 1900 Receiver off/Hotspot off | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 512 | 661 | 810 | | | 512 | 661 | 810 | |
| GSM(GMSK) | GSM | 29.35 | 29.31 | 29.38 | 30.50 | -9.19 | 20.16 | 20.12 | 20.19 | 21.31 |
| GPRS/ EGPRS (GMSK) | 1 TX Slot | 29.33 | 29.29 | 29.24 | 30.50 | -9.19 | 20.14 | 20.10 | 20.05 | 21.31 |
| | 2 TX Slots | 26.83 | 26.78 | 26.82 | 27.50 | -6.18 | 20.65 | 20.60 | 20.64 | 21.32 |
| | 3 TX Slots | 25.04 | 25.06 | 24.95 | 25.70 | -4.42 | 20.62 | 20.64 | 20.53 | 21.28 |
| | 4 TX Slots | 23.32 | 23.40 | 23.39 | 24.50 | -3.17 | 20.15 | 20.23 | 20.22 | **21.33** |
| EGPRS (8PSK) | 1 TX Slot | 25.45 | 25.52 | 25.27 | 27.00 | -9.19 | 16.26 | 16.33 | 16.08 | 17.81 |
| | 2 TX Slots | 22.24 | 22.19 | 22.20 | 24.00 | -6.18 | 16.06 | 16.01 | 16.02 | 17.82 |
| | 3 TX Slots | 20.35 | 20.37 | 20.22 | 22.20 | -4.42 | 15.93 | 15.95 | 15.80 | 17.78 |
| | 4 TX Slots | 19.11 | 19.15 | 19.02 | 21.00 | -3.17 | 15.94 | 15.98 | 15.85 | 17.83 |

| GSM 1900 Receiver on/Hotspot on | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Burst Output Power(dBm) | | | | | Tune up | Division Factors | Frame-Average Output Power(dBm) | | | Tune up |
| Channel | | 512 | 661 | 810 | | | 512 | 661 | 810 | |
| GSM(GMSK) | GSM | 25.35 | 25.26 | 25.34 | 27.00 | -9.19 | 16.16 | 16.07 | 16.15 | 17.81 |
| GPRS/ EGPRS (GMSK) | 1 TX Slot | 25.37 | 25.26 | 25.34 | 27.00 | -9.19 | 16.18 | 16.07 | 16.15 | 17.81 |
| | 2 TX Slots | 22.22 | 22.35 | 22.11 | 24.00 | -6.18 | 16.04 | 16.17 | 15.93 | 17.82 |
| | 3 TX Slots | 20.31 | 20.26 | 20.38 | 22.20 | -4.42 | 15.89 | 15.84 | 15.96 | 17.78 |
| | 4 TX Slots | 19.03 | 19.08 | 19.07 | 21.00 | -3.17 | 15.86 | 15.91 | 15.90 | **17.83** |
| EGPRS (8PSK) | 1 TX Slot | 21.50 | 21.51 | 21.54 | 23.50 | -9.19 | 12.31 | 12.32 | 12.35 | 14.31 |
| | 2 TX Slots | 18.53 | 18.62 | 18.55 | 20.50 | -6.18 | 12.35 | 12.44 | 12.37 | 14.32 |
| | 3 TX Slots | 16.77 | 16.72 | 16.81 | 18.70 | -4.42 | 12.35 | 12.30 | 12.39 | 14.28 |
| | 4 TX Slots | 15.59 | 15.64 | 15.61 | 17.50 | -3.17 | 12.42 | 12.47 | 12.44 | 14.33 |

Table 17：Conducted Power of GSM

Note:

1）. CMW500 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

| No. of timeslots | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Duty Cycle | 1:8.3 | 1:4.15 | 1:2.77 | 1:2.075 |
| Time based avg. power compared to slotted avg. power | -9.19 | -6.18 | -4.42 | -3.17 |

2）. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

3）. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used

### 8.1.3.2 Conducted Power of WCDMA

| WCDMA Band II Receiver off/Hotspot off | | | | | |
|---|---|---|---|---|---|
| Average Conducted Power(dBm) | | | | | |
| Channel | | 9262 | 9400 | 9538 | Tune up |
| WCDMA | 12.2kbps RMC | 21.88 | 21.82 | 21.79 | 23.00 |
| | 12.2kbps AMR | 21.83 | 21.79 | 21.77 | 23.00 |
| HSDPA | Subtest 1 | 21.20 | 21.21 | 21.29 | 22.00 |
| | Subtest 2 | 21.19 | 21.18 | 21.12 | 22.00 |
| | Subtest 3 | 20.72 | 20.64 | 20.70 | 21.50 |
| | Subtest 4 | 20.72 | 20.62 | 20.65 | 21.50 |
| HSUPA | Subtest 1 | 21.14 | 21.14 | 21.23 | 22.00 |
| | Subtest 2 | 19.24 | 19.09 | 19.19 | 20.00 |
| | Subtest 3 | 20.24 | 20.18 | 20.17 | 21.00 |
| | Subtest 4 | 19.19 | 19.07 | 19.29 | 20.00 |
| | Subtest 5 | 21.21 | 21.19 | 21.18 | 22.00 |
| DC-HSDPA | Subtest 1 | 21.17 | 21.24 | 21.31 | 22.00 |
| | Subtest 2 | 21.15 | 21.03 | 21.20 | 22.00 |
| | Subtest 3 | 20.72 | 20.72 | 20.73 | 21.50 |
| | Subtest 4 | 20.75 | 20.65 | 20.76 | 21.50 |
| HSPA+ | 16QAM | 19.59 | 19.65 | 19.77 | 20.50 |
| **WCDMA Band II Receiver on/Hotspot on** | | | | | |
| Average Conducted Power(dBm) | | | | | |
| Channel | | 9262 | 9400 | 9538 | Tune up |
| WCDMA | 12.2kbps RMC | 15.26 | **15.27** | **15.20** | 16.50 |
| | 12.2kbps AMR | 15.21 | 15.25 | 15.18 | 16.50 |
| HSDPA | Subtest 1 | 14.63 | 14.70 | 14.79 | 15.50 |
| | Subtest 2 | 14.61 | 14.62 | 14.52 | 15.50 |
| | Subtest 3 | 14.20 | 14.13 | 14.15 | 15.00 |
| | Subtest 4 | 14.17 | 14.04 | 14.07 | 15.00 |
| HSUPA | Subtest 1 | 14.57 | 14.61 | 14.70 | 15.50 |
| | Subtest 2 | 12.74 | 12.53 | 12.60 | 13.50 |
| | Subtest 3 | 13.68 | 13.62 | 13.58 | 14.50 |
| | Subtest 4 | 12.67 | 12.53 | 12.74 | 13.50 |
| | Subtest 5 | 14.66 | 14.62 | 14.65 | 15.50 |
| DC-HSDPA | Subtest 1 | 14.63 | 14.65 | 14.79 | 15.50 |
| | Subtest 2 | 14.57 | 14.46 | 14.67 | 15.50 |
| | Subtest 3 | 14.20 | 14.16 | 14.17 | 15.00 |
| | Subtest 4 | 14.18 | 14.09 | 14.17 | 15.00 |
| HSPA+ | 16QAM | 13.09 | 13.08 | 13.25 | 14.00 |

| WCDMA Band VI Receiver off/Hotspot off | | | | | |
|---|---|---|---|---|---|
| Average Conducted Power(dBm) | | | | | |
| Channel | | 1312 | 1412 | 1513 | Tune up |
| WCDMA | 12.2kbps RMC | **23.49** | **23.57** | **23.54** | 24.50 |
| | 12.2kbps AMR | 23.48 | 23.51 | 23.54 | 24.50 |
| HSDPA | Subtest 1 | 22.50 | 22.60 | 22.54 | 23.50 |
| | Subtest 2 | 22.49 | 22.45 | 22.51 | 23.50 |
| | Subtest 3 | 22.01 | 22.08 | 22.04 | 23.00 |
| | Subtest 4 | 21.94 | 22.03 | 22.00 | 23.00 |
| HSUPA | Subtest 1 | 22.51 | 22.58 | 22.55 | 23.50 |
| | Subtest 2 | 20.52 | 20.54 | 20.48 | 21.50 |
| | Subtest 3 | 21.49 | 21.60 | 21.49 | 22.50 |
| | Subtest 4 | 20.47 | 20.55 | 20.53 | 21.50 |
| | Subtest 5 | 22.45 | 22.58 | 22.51 | 23.50 |
| DC-HSDPA | Subtest 1 | 22.47 | 22.57 | 22.56 | 23.50 |
| | Subtest 2 | 22.53 | 22.41 | 22.61 | 23.50 |
| | Subtest 3 | 21.98 | 22.05 | 22.04 | 23.00 |
| | Subtest 4 | 21.99 | 22.03 | 21.95 | 23.00 |
| HSPA+ | 16QAM | 21.01 | 21.01 | 21.02 | 22.00 |
| **WCDMA Band VI Receiver on/Hotspot on** | | | | | |
| Average Conducted Power(dBm) | | | | | |
| Channel | | 1312 | 1412 | 1513 | Tune up |
| WCDMA | 12.2kbps RMC | 17.12 | 17.04 | 17.04 | 18.50 |
| | 12.2kbps AMR | 17.08 | 17.01 | 17.02 | 18.50 |
| HSDPA | Subtest 1 | 16.42 | 16.57 | 16.59 | 17.50 |
| | Subtest 2 | 16.58 | 16.55 | 16.51 | 17.50 |
| | Subtest 3 | 16.04 | 16.15 | 16.09 | 17.00 |
| | Subtest 4 | 15.95 | 16.06 | 16.08 | 17.00 |
| HSUPA | Subtest 1 | 16.54 | 16.49 | 16.50 | 17.50 |
| | Subtest 2 | 14.44 | 14.63 | 14.57 | 15.50 |
| | Subtest 3 | 15.48 | 15.61 | 15.48 | 16.50 |
| | Subtest 4 | 14.42 | 14.53 | 14.53 | 15.50 |
| | Subtest 5 | 16.46 | 16.60 | 16.52 | 17.50 |
| DC-HSDPA | Subtest 1 | 16.43 | 16.59 | 16.62 | 17.50 |
| | Subtest 2 | 16.42 | 16.40 | 16.60 | 17.50 |
| | Subtest 3 | 16.02 | 15.99 | 16.04 | 17.00 |
| | Subtest 4 | 15.92 | 16.10 | 15.96 | 17.00 |
| HSPA+ | 16QAM | 15.09 | 15.03 | 14.93 | 16.00 |

Table 18：Conducted Power of WCDMA

Note:

1) when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

### 8.1.3.3 Conducted Power of LTE

| LTE Band 2 Receiver off/Hotspot off | | | | Conducted Power(dBm) | | | |
|---|---|---|---|---|---|---|---|
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18607 | Channel 18900 | Channel 19193 | Tune up |
| **1.4MHz** | QPSK | 1 | 0 | 22.16 | 22.19 | 22.18 | 23.00 |
| | | 1 | 2 | 22.21 | 22.27 | 22.19 | 23.00 |
| | | 1 | 5 | 22.19 | 22.31 | 22.16 | 23.00 |
| | | 3 | 0 | 22.15 | 22.24 | 22.22 | 23.00 |
| | | 3 | 2 | 22.26 | 22.36 | 22.18 | 23.00 |
| | | 3 | 3 | 22.26 | 22.28 | 22.23 | 23.00 |
| | | 6 | 0 | 21.37 | 21.31 | 21.28 | 22.00 |
| | 16QAM | 1 | 0 | 21.50 | 21.31 | 21.72 | 22.00 |
| | | 1 | 2 | 21.63 | 21.55 | 21.65 | 22.00 |
| | | 1 | 5 | 21.44 | 21.45 | 21.25 | 22.00 |
| | | 3 | 0 | 21.28 | 21.28 | 21.40 | 22.00 |
| | | 3 | 2 | 21.39 | 21.33 | 21.22 | 22.00 |
| | | 3 | 3 | 21.27 | 21.32 | 21.43 | 22.00 |
| | | 6 | 0 | 20.35 | 20.47 | 20.38 | 21.00 |
| | 64QAM | 1 | 0 | 20.51 | 20.28 | 20.69 | 21.00 |
| | | 1 | 2 | 20.63 | 20.61 | 20.64 | 21.00 |
| | | 1 | 5 | 20.41 | 20.51 | 20.29 | 21.00 |
| | | 3 | 0 | 20.31 | 20.32 | 20.46 | 21.00 |
| | | 3 | 2 | 20.39 | 20.33 | 20.25 | 21.00 |
| | | 3 | 3 | 20.31 | 20.33 | 20.44 | 21.00 |
| | | 6 | 0 | 19.39 | 19.44 | 19.43 | 20.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18615 | Channel 18900 | Channel 19185 | Tune up |
| **3MHz** | QPSK | 1 | 0 | 22.21 | 22.13 | 22.31 | 23.00 |
| | | 1 | 7 | 22.38 | 22.27 | 22.42 | 23.00 |
| | | 1 | 14 | 22.34 | 22.27 | 22.27 | 23.00 |
| | | 8 | 0 | 21.48 | 21.39 | 21.43 | 22.00 |
| | | 8 | 4 | 21.39 | 21.38 | 21.36 | 22.00 |
| | | 8 | 7 | 21.35 | 21.45 | 21.22 | 22.00 |
| | | 15 | 0 | 21.46 | 21.34 | 21.38 | 22.00 |
| | 16QAM | 1 | 0 | 21.45 | 21.60 | 21.63 | 22.00 |
| | | 1 | 7 | 21.45 | 21.44 | 21.51 | 22.00 |
| | | 1 | 14 | 21.84 | 21.16 | 21.58 | 22.00 |
| | | 8 | 0 | 20.54 | 20.50 | 20.48 | 21.00 |
| | | 8 | 4 | 20.52 | 20.42 | 20.41 | 21.00 |
| | | 8 | 7 | 20.49 | 20.30 | 20.36 | 21.00 |
| | | 15 | 0 | 20.60 | 20.47 | 20.47 | 21.00 |
| | 64QAM | 1 | 0 | 20.43 | 20.60 | 20.64 | 21.00 |
| | | 1 | 7 | 20.46 | 20.48 | 20.49 | 21.00 |
| | | 1 | 14 | 20.84 | 20.22 | 20.62 | 21.00 |
| | | 8 | 0 | 19.51 | 19.53 | 19.54 | 20.00 |
| | | 8 | 4 | 19.51 | 19.42 | 19.46 | 20.00 |
| | | 8 | 7 | 19.46 | 19.33 | 19.33 | 20.00 |
| | | 15 | 0 | 19.63 | 19.52 | 19.46 | 20.00 |

| Bandwidth | Modulation | RB size | RB offset | Channel 18625 | Channel 18900 | Channel 19175 | Tune up |
|---|---|---|---|---|---|---|---|
| 5MHz | QPSK | 1 | 0 | 22.13 | 22.04 | 22.19 | 23.00 |
| | | 1 | 13 | 22.34 | 22.25 | 22.29 | 23.00 |
| | | 1 | 24 | 22.15 | 22.00 | 22.18 | 23.00 |
| | | 12 | 0 | 21.38 | 21.37 | 21.41 | 22.00 |
| | | 12 | 6 | 21.34 | 21.41 | 21.27 | 22.00 |
| | | 12 | 13 | 21.28 | 21.34 | 21.23 | 22.00 |
| | | 25 | 0 | 21.34 | 21.31 | 21.27 | 22.00 |
| | 16QAM | 1 | 0 | 21.43 | 21.48 | 21.98 | 22.00 |
| | | 1 | 13 | 21.63 | 22.00 | 21.94 | 22.00 |
| | | 1 | 24 | 21.34 | 21.81 | 21.19 | 22.00 |
| | | 12 | 0 | 20.42 | 20.40 | 20.28 | 21.00 |
| | | 12 | 6 | 20.36 | 20.40 | 20.35 | 21.00 |
| | | 12 | 13 | 20.28 | 20.27 | 20.26 | 21.00 |
| | | 25 | 0 | 20.30 | 20.29 | 20.34 | 21.00 |
| | 64QAM | 1 | 0 | 20.49 | 20.48 | 20.86 | 21.00 |
| | | 1 | 13 | 20.66 | 20.88 | 20.90 | 21.00 |
| | | 1 | 24 | 20.30 | 20.86 | 20.22 | 21.00 |
| | | 12 | 0 | 19.42 | 19.42 | 19.28 | 20.00 |
| | | 12 | 6 | 19.35 | 19.39 | 19.41 | 20.00 |
| | | 12 | 13 | 19.30 | 19.25 | 19.23 | 20.00 |
| | | 25 | 0 | 19.26 | 19.28 | 19.39 | 20.00 |
| **Bandwidth** | Modulation | RB size | RB offset | Channel 18650 | Channel 18900 | Channel 19150 | Tune up |
| 10MHz | QPSK | 1 | 0 | 21.69 | 22.38 | 22.23 | 23.00 |
| | | 1 | 25 | 22.06 | 22.18 | 22.33 | 23.00 |
| | | 1 | 49 | 21.93 | 21.86 | 22.12 | 23.00 |
| | | 25 | 0 | 21.12 | 21.28 | 21.30 | 22.00 |
| | | 25 | 13 | 21.28 | 21.28 | 21.34 | 22.00 |
| | | 25 | 25 | 21.34 | 21.28 | 21.24 | 22.00 |
| | | 50 | 0 | 21.31 | 21.20 | 21.29 | 22.00 |
| | 16QAM | 1 | 0 | 21.48 | 21.37 | 21.96 | 22.00 |
| | | 1 | 25 | 21.47 | 21.56 | 21.45 | 22.00 |
| | | 1 | 49 | 20.93 | 21.61 | 22.00 | 22.00 |
| | | 25 | 0 | 20.21 | 20.33 | 20.27 | 21.00 |
| | | 25 | 13 | 20.37 | 20.39 | 20.43 | 21.00 |
| | | 25 | 25 | 20.15 | 20.15 | 20.24 | 21.00 |
| | | 50 | 0 | 20.24 | 20.27 | 20.38 | 21.00 |
| | 64QAM | 1 | 0 | 20.47 | 20.43 | 20.96 | 21.00 |
| | | 1 | 25 | 20.49 | 20.56 | 20.49 | 21.00 |
| | | 1 | 49 | 19.96 | 20.62 | 20.83 | 21.00 |
| | | 25 | 0 | 19.26 | 19.36 | 19.23 | 20.00 |
| | | 25 | 13 | 19.36 | 19.35 | 19.42 | 20.00 |
| | | 25 | 25 | 19.15 | 19.18 | 19.21 | 20.00 |
| | | 50 | 0 | 19.27 | 19.33 | 19.40 | 20.00 |