



PART 0 SAR CHAR REPORT

No. 24T04Z101591-016

For

Guangdong OPPO Mobile Telecommunications Corp., Ltd.

Mobile Phone

Model Name: CPH2659

with

Hardware Version: 11

Software Version: Color OS 15.0

FCC ID: R9C-OP23216

Issued Date: 2024-10-21

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: ctl_terminals@caict.ac.cn, website: www.caict.ac.cn



No. 24T04Z101591-016

REPORT HISTORY

| Report Number | Revision | Issue Date | Description |
|----------------------|-----------------|-------------------|---------------------------------|
| 24T04Z101591-016 | Rev.0 | 2024-10-21 | Initial creation of test report |



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1 Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

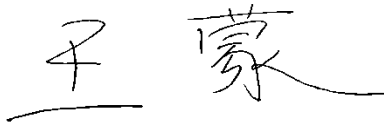
1.3. Testing Environment

Normal Temperature: 15-35°C
Extreme Temperature: -10/+55°C
Relative Humidity: 20-75%

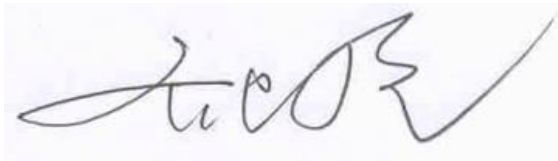
1.4. Project data

Testing Start Date: 2024-08-30
Testing End Date: 2024-10-18

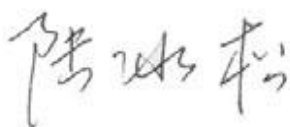
1.5. Signature



Wang Meng
(Prepared this test report)



Qi Dianyuan
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)



2 Introduction

The equipment under test (EUT) is a smart phone. It contains the MTK modem supporting 2G/3G/4G technologies and 5G NR Sub-6 GHz technologies. These modems enable MTK TAS feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement.

In the Part 0 report, the EUT SAR are characterized for WWAN radios (3G/4G/Sub6 NR) to determine the power limit that corresponds to the exposure design target after accounting for all device design related uncertainties, i.e., SAR_design_target (< CE SAR limit) for sub-6. The SAR characterization are denoted as SAR Char. SAR Char will be used as input for MTK TAS to operate.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time- varying) transmission scenario for WWAN technologies are reported in Part 2 report.

The EUT supports WLAN/BT radio as well but WLAN/BT modem is not enabled with TAS.

Nomenclature for Part 0 Report

| Term | Description |
|--------------------|---|
| P_{limit} | The time-averaged RF power which corresponds to SAR_design_target. |
| P_{max} | Maximum target power level |
| SAR_design_target: | The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainties. |
| SAR Char | P_{limit} for all the technologies/bands for all applicable ECI |



3 Equipment Under Test (EUT) Overview

| | | | |
|-------------------------------------|---|--|------------|
| Description: | Mobile Phone | | |
| Model name: | CPH2659 | | |
| Tested Band: | GSM850/1900, WCDMA B2/4/5 LTE Band FDD:2/4/5/7/12/13/17/25/26/66 LTE Band TDD:38/41 5G NR N2/5/7/12/25/26/38/41/66 BT, Wi-Fi(2.4G), Wi-Fi(5G), Wi-Fi(6E),NFC | | |
| Tx Frequency: | 824 – 849 MHz (GSM 850) | | |
| | 1850 – 1910 MHz (GSM 1900) | | |
| | 824–849 MHz (WCDMA 850 Band V) | | |
| | 1710 – 1755 MHz (WCDMA 1700 Band IV) | | |
| | 1850–1910 MHz (WCDMA1900 Band II) | | |
| | 1850 – 1910 MHz(LTE Band 2) | | |
| | 1710 – 1755 MHz (LTE Band 4) | | |
| | 824 – 849 MHz (LTE Band 5) | | |
| | 2500 – 2570 MHz(LTE Band 7) | | |
| | 699 – 716 MHz (LTE Band 12) | | |
| | 777 –787 MHz (LTE Band 13) | | |
| | 704 –716 MHz (LTE Band 17) | | |
| | 1850 – 1915 MHz(LTE Band 25) | | |
| | 814 – 849 MHz (LTE Band 26) | | |
| | 2570 – 2620 MHz (LTE Band 38) | | |
| | 2496 – 2690 MHz (LTE Band 41) | | |
| | 1710 – 1780 MHz (LTE Band 66) | | |
| | 2412 – 2462 MHz (Wi-Fi 2.4G) | | |
| | 5180 – 5240 MHz | | (Wi-Fi 5G) |
| | 5260 – 5320 MHz | | |
| | 5500 – 5700 MHz | | |
| | 5745 – 5825 MHz | | |
| | 5925 – 6425 MHz | | (Wi-Fi 6E) |
| | 6425 – 6525 MHz | | |
| | 6525 – 6875 MHz | | |
| | 6875 – 7125 MHz | | |
| | 2400 – 2483.5 MHz (Bluetooth) | | |
| | 1850 – 1910 MHz(n2) | | |
| | 824 – 849 MHz(n5) | | |
| | 2500 – 2570 MHz (n7) | | |
| | 699 – 716 MHz (n12) | | |
| | 1850 – 1915 MHz(n25) | | |
| | 814 – 849 MHz (n26) | | |
| 2570 – 2620 MHz (n38) | | | |
| 2496 – 2690 MHz (n41) | | | |
| 1710– 1780 MHz (n66) | | | |
| 13.56 MHz (NFC) | | | |
| GPRS/EGPRS Multislot Class: | 33 | | |
| Test device production information: | Production unit | | |
| Device type: | Portable device | | |
| Antenna type: | Integrated antenna | | |



| | |
|---------------|---------|
| Hotspot mode: | Support |
|---------------|---------|

4 SAR Characterization

4.1 ESI and SAR Determination

This device uses different Device State Index (ECI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR is further grouped and determined for each or combined exposure scenario

DSI and Corresponding Exposure Scenarios

| Scenario | Description |
|----------|----------------------------|
| ECI 1 | Body (Standalone) |
| ECI 2 | Head (Standalone) |
| ECI 3 | Body (WWAN+WLAN2.4/5/6+BT) |
| ECI 4 | Head (WWAN+WLAN2.4/5/6+BT) |
| ECI 5 | Body (WWAN+WLAN2.4+5/6+BT) |
| ECI 6 | Head (WWAN+WLAN2.4+5/6+BT) |

4.2 SAR Design Target and Uncertainty

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer.

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR_design_target < SAR_{regulatory_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

| | Exposure conditions | DSI | SAR design target | W/kg |
|---------------------|---------------------|-----|-----------------------|------|
| stand-alone | Body (2G/3G/4G/NR) | 1 | 1g SAR design target | 1.20 |
| | Limbs(2G/3G/4G/NR) | 1 | 10g SAR design target | 3.00 |
| | Head(2G/3G/4G/NR) | 2 | 1g SAR design target | 1.20 |
| WWAN+WLAN2.4/5/6+BT | Body (2G/3G/4G/NR) | 3 | 1g SAR design target | 0.79 |
| | Limbs(2G/3G/4G/NR) | 3 | 10g SAR design target | 1.90 |
| | Head(2G/3G/4G/NR) | 4 | 1g SAR design target | 0.99 |
| WWAN+WLAN2.4+5/6+BT | Body (2G/3G/4G/NR) | 3 | 1g SAR design target | 0.59 |
| | Limbs(2G/3G/4G/NR) | 3 | 10g SAR design target | 1.40 |
| | Head(2G/3G/4G/NR) | 4 | 1g SAR design target | 0.79 |

| | Uncertainty Db 2G | Uncertainty dB 3G/4G | Uncertainty dB NR |
|-------------------|-------------------|----------------------|-------------------|
| Total uncertainty | 1.0 | 0.8 | 1.2 |



4.2 SAR Char

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating. P_{limit} is calculated by linearly scaling with the measured SAR at the P_{part0} to correspond to the SAR_{design_target} . When $P_{limit} < P_{max}$, P_{part0} was used as P_{limit} in the TAS ECI. When $P_{limit} > P_{max}$ and $P_{part0} = P_{max}$, calculated P_{max} was used in the TAS ECI. All reported SAR obtained from the P_{part0} SAR tests was less than $SAR_{Design_target} +$ device uncertainty.

| Band | Antenna | Duty Cycle | DSI 1 | DSI 2 | DSI 3 | DSI 4 | DSI 5 | DSI 6 | Pmax |
|----------------|---------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | | brust power | brust power | brust power | brust power | brust power | brust power | brust power |
| GSM850 | 0 | 12.50% | 32.1 | 30.6 | 30.5 | 29.8 | 29.3 | 28.8 | 32.6 |
| | 5 | | 30 | 30 | 28.2 | 30 | 26.9 | 30 | 30 |
| GSM1900 | 5 | 100% | 21 | 24.2 | 19 | 24.2 | 17.7 | 24.2 | 24.2 |
| | 6 | | 19 | 15.2 | 17.1 | 14.4 | 15.7 | 13.4 | 24.1 |
| WCDMA Band 2 | 5 | 100% | 19.2 | 24.2 | 17.3 | 24.2 | 16.1 | 24.2 | 24.2 |
| | 6 | | 19.9 | 13.8 | 17.9 | 13 | 16.6 | 12 | 24.2 |
| WCDMA Band 4 | 0 | 100% | 23.6 | 21.1 | 22.2 | 20.3 | 20.9 | 19.3 | 23.6 |
| | 1 | | 24.1 | 24.1 | 24.1 | 24.1 | 22.7 | 24.1 | 24.1 |
| WCDMA Band 5 | 5 | 100% | 17.7 | 23.7 | 15.8 | 23.7 | 14.6 | 23.7 | 24.2 |
| | 6 | | 16 | 13.4 | 14.2 | 12.5 | 12.9 | 11.6 | 23.9 |
| LTE Band2 | 5 | 100% | 21 | 23.7 | 19.7 | 23.7 | 18.4 | 23.7 | 24.2 |
| | 6 | | 19 | 16 | 16.7 | 13.7 | 15.4 | 12.7 | 23.7 |
| LTE Band4 | 4 | 100% | 15.2 | 17.2 | 13.3 | 16.3 | 12.1 | 15.4 | 21.8 |
| | 7 | | 20.1 | 17.6 | 18.3 | 16.8 | 17 | 15.7 | 24 |
| LTE Band5 | 0 | 100% | 22.8 | 22.8 | 20.8 | 21.8 | 19.8 | 20.8 | 23.8 |
| | 1 | | 24.2 | 24.2 | 24.2 | 24.2 | 23.5 | 24.2 | 24.2 |
| LTE Band7 | 5 | 100% | 19.6 | 24.2 | 17.7 | 24.2 | 16.3 | 24.2 | 24.2 |
| | 6 | | 18.3 | 16.9 | 15 | 14.6 | 13.7 | 13.7 | 23.8 |
| LTE Band12 | 4 | 100% | 16.3 | 15 | 14.3 | 14.2 | 13 | 13.2 | 21 |
| | 7 | | 18.4 | 14.4 | 16.6 | 13.6 | 15.3 | 12.6 | 23.9 |
| LTE Band13 | 0 | 100% | 21.4 | 21.2 | 19.6 | 20.3 | 18.4 | 19.3 | 23.4 |
| | 1 | | 23.8 | 23.8 | 22.7 | 23.8 | 21.4 | 23.8 | 23.8 |
| LTE Band17 | 0 | 100% | 21.7 | 21.5 | 19.9 | 20.6 | 18.7 | 19.6 | 23.7 |
| | 1 | | 24 | 24 | 22.9 | 24 | 21.6 | 24 | 24 |
| LTE Band25 | 0 | 100% | 21.4 | 21.2 | 19.6 | 20.3 | 18.4 | 19.3 | 23.4 |
| | 1 | | 23.8 | 23.8 | 22.7 | 23.8 | 21.4 | 23.8 | 23.8 |
| LTE Band26 | 5 | 100% | 17.7 | 23.7 | 15.8 | 23.7 | 14.6 | 23.7 | 24.2 |
| | 6 | | 16 | 13.4 | 14.2 | 12.5 | 12.9 | 11.6 | 23.9 |
| LTE Band38 | 0 | 63.30% | 22.8 | 22.8 | 20.8 | 21.8 | 19.8 | 20.8 | 23.8 |
| | 1 | | 24.2 | 24.2 | 24.2 | 24.2 | 23.5 | 24.2 | 24.2 |
| LTE Band41 PC2 | 5 | 43.30% | 20.3 | 24.2 | 18.3 | 24.2 | 16.9 | 24.2 | 24.2 |
| | 6 | | 19.5 | 16.9 | 15.7 | 14.2 | 14.3 | 13.2 | 24.2 |
| LTE Band41 PC3 | 4 | 63.30% | 19.2 | 16.7 | 15.7 | 14.2 | 14.4 | 13.2 | 21 |
| | 7 | | 18.5 | 16.5 | 16.7 | 15.5 | 15.4 | 14.5 | 24 |
| LTE Band66 | 5 | 100% | 20.2 | 26 | 16.8 | 26 | 15.4 | 26 | 26 |
| | 6 | | 20.7 | 19.5 | 15.8 | 15.7 | 14.5 | 14.7 | 25.2 |
| N2 | 4 | 100% | 19.7 | 18.5 | 16.3 | 16.2 | 15 | 15.2 | 23 |
| | 7 | | 20.3 | 16.3 | 17 | 14 | 15.7 | 13 | 26 |
| N5 | 5 | 100% | 19 | 23 | 13.8 | 23 | 12.4 | 23 | 23 |
| | 6 | | 19.4 | 18.2 | 13.2 | 13.1 | 11.9 | 12.1 | 22.6 |
| N7 | 4 | 100% | 18.5 | 17.2 | 13.3 | 13.2 | 12 | 12.2 | 20 |
| | 7 | | 19 | 15 | 14 | 11 | 12.7 | 10 | 23 |
| N12 | 5 | 100% | 21 | 23.7 | 19.7 | 23.7 | 18.4 | 23.7 | 24.2 |
| | 6 | | 19 | 16 | 16.7 | 13.7 | 15.4 | 12.7 | 23.7 |
| N25 | 4 | 100% | 15.2 | 17.2 | 13.3 | 16.3 | 12.1 | 15.4 | 21.8 |
| | 7 | | 20.1 | 17.6 | 18.3 | 16.8 | 17 | 15.7 | 24 |
| N26 | 5 | 100% | 19.6 | 24 | 18.1 | 24 | 16.8 | 24 | 24 |
| | 6 | | 17.4 | 15.3 | 16.2 | 14.9 | 14.9 | 13.9 | 24.2 |
| N38 | 0 | 100% | 21 | 21.2 | 19.2 | 20.3 | 18 | 19.3 | 23.8 |
| | 1 | | 24.1 | 24.1 | 22.2 | 24.1 | 20.9 | 24.1 | 24.1 |
| N41 | 5 | 100% | 19.6 | 24.2 | 17.7 | 24.2 | 16.3 | 24.2 | 24.2 |
| | 6 | | 17.4 | 16.9 | 15.4 | 16 | 14.1 | 15.1 | 24.2 |
| N66 | 4 | 100% | 13.4 | 12.1 | 11.4 | 11.3 | 10.1 | 10.3 | 21.2 |
| | 7 | | 16.7 | 15.7 | 14.7 | 14.7 | 13.7 | 13.7 | 24.2 |
| N7 | 0 | 100% | 19.8 | 19.8 | 19.2 | 19.8 | 18 | 19.3 | 23.8 |
| | 1 | | 24.2 | 24.2 | 22.2 | 24.2 | 20.9 | 24.2 | 24.2 |
| N12 | 5 | 100% | 19.8 | 24 | 17.9 | 24 | 16.6 | 24 | 24 |
| | 6 | | 18.1 | 15.4 | 17.3 | 15.4 | 15.9 | 14.5 | 24.2 |
| N25 | 0 | 100% | 21 | 21.2 | 19.2 | 20.3 | 18 | 19.3 | 23.8 |
| | 1 | | 24.2 | 24.2 | 22.2 | 24.2 | 20.9 | 24.2 | 24.2 |
| N26 | 5 | 100% | 20.3 | 24.2 | 18.3 | 24.2 | 16.9 | 24.2 | 24.2 |
| | 6 | | 17.7 | 17.1 | 15.7 | 16.2 | 14.3 | 15.3 | 24.2 |
| N38 | 4 | 100% | 13.6 | 12.3 | 11.6 | 11.5 | 10.3 | 10.5 | 21.2 |
| | 7 | | 18.7 | 16.2 | 16.9 | 15.2 | 15.6 | 14.2 | 24.2 |
| N41 | 5 | 100% | 18.7 | 25.3 | 16.8 | 25.3 | 15.4 | 25.3 | 25.3 |
| | 6 | | 18 | 18.4 | 16 | 17.5 | 14.7 | 16.5 | 26 |
| N66 | 4 | 100% | 16.8 | 15.5 | 14.8 | 14.7 | 13.5 | 13.7 | 24 |
| | 7 | | 17.3 | 15 | 15.5 | 14 | 14.5 | 13 | 26.5 |
| N7 | 5 | 100% | 20 | 23 | 18.2 | 23 | 16.9 | 23 | 24.2 |
| | 6 | | 17.8 | 14.3 | 16 | 13.5 | 14.7 | 12.5 | 24 |
| N12 | 4 | 100% | 12.8 | 13.8 | 10.9 | 13 | 9.7 | 12 | 21.8 |
| | 7 | | 19.8 | 16.3 | 18.5 | 15.8 | 17.2 | 14.8 | 24.2 |

Note:

1 When Pmax < Plimit, the DUT will operate at a power level up to Pmax.

2 Pmax is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + device uncertainty.



5 Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.